DOCUMENT RESUME

ED 142 708 08 CE 011 449

AUTHOR Wahl, Ray
TITLE A Safety and Health Guide for Vocational Educators. Incorporating Requirements of the Occupational Safety and Health Act of 1970, Relevant Pennsylvania Requirements with Particualr Emphasis for Those Concerned with Cooperative Education and Work Study Programs. Volume 15. Number 1.
INSTITUTION Pennsylvania State Dept. of Education, Harrisburg. Bureau of Vocational and Technical Education.
BUREAU NO 24-6074
PUB DATE Feb 77
NOTE 165p.

EDRS PRICE MF-$0.83 HC-$8.69 Plus Postage.
DESCRIPTORS Child Labor Legislation; *Cooperative Education; Curriculum Development; Federal Legislation; Guides; Health Education; *Labor Standards; *Legal Responsibility; Program Coordination; Safety; *Safety Education; Secondary Education; Standards; State Legislation; *Vocational Education
IDENTIFIERS Occupational Safety and Health Act 1970; Pennsylvania

ABSTRACT

Intended as a guide for vocational educators to incorporate the requirements of the Occupational Safety and Health Act (1970) and the requirements of various Pennsylvania safety and health regulations with their cooperative vocational programs, the first chapter of this document presents the legal implications of these safety and health regulations and focuses on their applicability to the school and the school's personnel. Chapter 2 details the provisions and standards of these regulations and clarifies the human factors involved. Included in the third chapter are all the definitions, the format, guidelines, procedures, and related information needed by the educator for incorporating safety and health into the educational program. The fourth chapter presents a self-inspection checklist, and the fifth chapter provides a list of hazards and standards along with the source of each. The final chapter provides a list of resource materials and identifies several agencies and organizations who provide assistance and additional information. Included in the appendix are a suggested statement of safety and health policy and excerpts from Federal regulations related to child labor practices, orders, and statements of interpretation. (BM)

Documents acquired by ERIC include many informal unpublished materials not available from other sources. ERIC makes every effort to obtain the best copy available. Nevertheless, items of marginal reproducibility are often encountered and this affects the quality of the microfiche and hardcopy reproductions ERIC makes available via the ERIC Document Reproduction Service (EDRS). EDRS is not responsible for the quality of the original document. Reproductions supplied by EDRS are the best that can be made from the original.

ED142708

A SAFETY AND HEALTH GUIDE FOR VOCATIONAL EDUCATORS

Incorporating Requirements of the
Occupational Safety and Health Act of 1970,
Relevant Pennsylvania Requirements

with

Particular Emphasis for Those Concerned
with
Cooperative Education and Work Study Programs

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Ray Wahl
Professor, Vocational Education
The Pennsylvania State University

Copyright 1977

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Ray Wahl
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND THE ERIC SYSTEM CONTRACTORS."

Volume 15, Number 1

Pennsylvania Department of Education
Bureau of Vocational Education
(Project No. 24-6074)

February, 1977

CE 011 449

CONTENTS

		Page
Acknowledgments		vii
Advisory Committee		viii
Introduction		xi
Chapter		
I	LEGAL IMPLICATIONS	1
	Applicability of the Occupational Safety and Health Act to Schools	1
	Schools Basically Excluded	1
	Inclusion Through State Plans	1
	Student Applicability	2
	Modified State Plan Inclusion Potential	2
	Inclusion Under Pennsylvania Laws	3
	General Safety Law	3
	Boiler, Elevator, Fire and Panic Laws	3
	Department of Education; School Code	4
	School-Educator-Pupil Relationships	5
	Legal Implications	5
	Liability	5
	Accountability	6
	Responsibility	6
	Meeting Obligations	7
	Commonwealth vs OSHA Regulations	8
	Safety and Health Inseparable	8
II	EDUCATION-EDUCATOR CONSIDERATIONS	11
	Understanding the Laws	11
	The Occupational Safety and Health Act of 1970	11
	Provisions	11
	Standards	12
	Pennsylvania Safety and Health Laws	16
	Pennsylvania Regulations	17
	Human Factors	21

Contents, continued:

Chapter		Page
III	PROGRAMMING FOR SAFETY AND HEALTH	25
	Definition	25
	A Safety and Health Program Format	26-27
	Safety and Health Programming	26
	Program Elements Diagram, Figure 2	28
	Employer Acceptance of Responsibility	29
	Standards and Hazards Identification	29
	Environmental Hazards (and Standards) Identification: Survey and Analysis	29
	Types of Standards	29
	Relevance of Hazards; Standards	30
	Essentiality of Layout	30
	Survey Performance	31
	Human Hazard Identification: Job Hazard Analysis	31
	Job Hazard Analysis Elements	32
	Format, Figure 3	33
	Hazard Identification and Correction	32
	Hazard Control Methods	34
	Planning and Priorities	34
	Inspection Procedure Development	35
	Assignment of Responsibility	36
	Checklist Development	36
	Self-Inspection	36
	Who Should Inspect	37
	Inspection Frequency	37
	Types of Inspections	37
	Inspection Frequency	38
	Inspection Coverage	38
	Inspection Routes	38
	Accident Investigation and Recording	39
	Identifying Recording Needs	39
	Accident Investigation and Recording Procedures	39
	Assignment of Responsibilities	40
	Accident Data Collection and Reporting	40
	Analysis of Inspection and Accident Records	40
	Corrective Recommencations	41
	Abatement Accomplishment	41
	Program Evaluation	41
	Program Organization and Implementation	42
	Integration into the Total Activity	42
	Responsibility	42
	The Person in Charge	43
	Types of Organizations	43
	Line Organization	43
	Staff Organization	44
	Committee Organization	44

Contents, continued:

Chapter		Page
IV	A SELF-INSPECTION CHECKLIST	47
	UOSHA [Utah] Standards and Safety Recommendations	47
	Health Hazards	87
V	HAZARD AND STANDARD IDENTIFICATION	91
	Universal Standards	91
	Selected Occupational Standards (from Project Reports)	112-129
	Appliance Repair	113
	Auto Body Repair	112
	Auto Mechanic	112
	Baking	112
	Carpentry	114
	Commercial Art	116
	Computer Programming	116
	Construction	117
	Cosmetology	116
	Dairy Barn	121
	Dental Assistant	120
	Diesel Mechanic	113
	Drafting	117
	Electricity; Electronics	117
	Food Services [presented in entirety as example]	93-111
	Foundry	119
	Graphic Arts	119
	Health Assistant	120
	Horticulture	121
	Laboratory	120
	Machine Shop	122
	Maintenance	122
	Masonry	123
	Needle Trades	125
	Office and Classroom	125
	Plumbing	125
	Welding	127
VI	RESOURCES: MATERIALS AND INFORMATION	131
BIBLIOGRAPHY		135

Contents, continued:

Page

APPENDIX

A A Suggested Statement of Safety and Health Policy 141

B Excerpts from A *Guide to Child Labor Provisions* of the Federal *Fair Labor Standards Act* 145

C Excerpts from Child Labor Regulations, Orders, and Statements of Interpretation: Federal *Hazardous Occupations in Agriculture* 153

FIGURES

1. A School Safety and Health Program Format 27

2. Safety and Health Programming 28

3. Job Hazard Analysis 33

ACKNOWLEDGMENTS

It is with a deep sense of indebtedness that the writer of this compilation acknowledges the innumerable contributions, by more individuals than space here allows, without which this undertaking could not have succeeded.

In the effort to recapitulate the services and assistance of others, there are first A. M. Best and Company, Oldwick, N. J., and the Utah State Board of Education, Walter D. Talbot, Superintendent of Public Instruction; Walter E. Ulrich, Director of Vocational Technical Education, and Joe O. Luke, Industrial Education Specialist, who graciously permitted the incorporation of portions of their publications herein.

There are also Pennsylvania State University Division of Occupational and Vocational Studies faculty colleagues, among them Mr. Richard Holodick, who broached the need for the effort, Dr. Frederick G. Welch, whose interest and proposal made the project possible, and Dr. Frank W. Adelman, whose invaluable and generous assistance cleared many hurdles, plus the patient, continuing coordination of Mr. Robert Burchfield, Consultant for Work Study, Exemplary Programs and Cooperative Education, Bureau of Vocational Education, Pennsylvania Department of Education. There are further the immediate material responses by Messrs. M. Robert Epler, Technical and Industrial Education Coordinator, Berks AVTS; E. Clair Greene, Vocational Education Coordinator, Altoona AVTS; Joseph P. Saam, Cooperative Education Coordinator, Lebanon County AVTS; Norman States, Cooperative Education Coordinator, York County AVTS, and A. H. Weidman, Cooperative Education Coordinator, Lancaster County Area AVTS, which combined to establish project parameters.

Still further are the numerous instances of support and assistance by members of the Advisory Committee, named on the succeeding several pages, and former Students Robert W. Biddle, John J. Bury, Stacy Cartledge, Harold E. Cohick, James Cramer, Mary Cunningham, Chester DiRomualdo, Hugh Dugan III, Marion S. Earhart, Ralph E. Gibble, Nina Gilbert, Donald C. Heffelfinger, Jr., Robert Hinger, Wilson Hixon, Joseph Hogarth, Terry Houck, Ronald Hoyman, Fred E. Jenkins, Nina Johnson, Rose Ann Kublic, Artie Kunselman, Patti Lewis, Todd Moser, Pauline Onestak, Robert H. Quiggle, John Recklitis, Jayson P. Reitz, Edward Roadarmel, Mike Salisbury, Wayne Sweeney, James Verbeck, Bruce E. Victoriano, Charles Winther, John Zavatsky, Edith Zeart, William A. Zehner, and John Ziegler, whose course assignments comprised a most material contribution to this effort.

Finally, there is the tireless dedication exhibited by Miss Kathy Spicer, Mrs. Linda Holodick and Mrs. Mary Lovette in the preparation of this publication, and the understanding and generous sharing of many arduous tasks by Mrs. Peggy Spangler, thus enabling the writer to devote himself more completely to this one.

To these, and others too numerous to mention, and for which apology is proffered, the writer is humbly grateful.

ADVISORY COMMITTEE

Mr. Donald L. Alsedek, Instructor
Food Services and Management
Cumberland-Perry AVTS
640 Santawna Drive
Harrisburg, PA 17109

Mr. James J. Barefoot, Director
Vocational Education
Carlisle Area School District
623 West Penn Street
Carlisle, PA 17103

Mr. Chester B. Chrzanowski, Instructor
Baking
Stevens Trade School
410 Philmont Drive
Lancaster, PA 17601

Mr. Harold E. Cohick, Instructor
Refrigeration/Appliance Repair
Franklin County AVTS
Street R. #3
Shippensburg, PA 17257

Mr. Henry Cushard, Instructor
Welding
Clearfield County AVTS
P.O. Box 1028
Clearfield, PA 16830

Mr. Charles E. Detrich, Jr.
Auto Mechanic Instructor
Franklin County AVTS
Box 66
Fort Loudon, PA 17224

Mr. Ralph E. Gibble, Instructor
Plumbing and Heating
Mount Joy AVTS
R. D. #2
Mount Joy, PA 17552

Mr. William Hastings, Instructor
Electricity
Keystone Central School District
Box 408, R. D. #1
Lock Haven, PA 17745

Mr. Paul L. Heim, Instructor
Carpentry
Williamsport Area Community College
1307 Jefferson Avenue
Lewisburg, PA 17837

Mr. Terry L. Houck
Machinist
Erie Technological Products
1900 West College Avenue
State College, PA 16801

Mr. Robert E. Jenkins
Machinist
Milton Machine Works
R. D. #4
Danville, PA 17821

Mrs. Nina M. Johnson, Instructor
Textile Products and Fabrics
Clearfield County AVTS
R. D. #1 Box 156
Frenchville, PA 16836

Mr. Donald E. Evans, Director
Cooperative Education
Office of Student Affairs
The Pennsylvania State University
426 Boucke Building
University Park, PA 16802

Mr. Edgar I. Farmer
Graduate Assistant
Division of Occupational and
Vocational Studies
The Pennsylvania State University
119 Rackley Building
University Park, PA 16802

Mr. James W. Little, Instructor
Aviation Mechanic
Williamsport Area Community College
107 Sprout Road
Muncy, PA 17756

Miss Paulette Onestak, Professor
Horticulture
Williamsport Area Community College
31 South Sixth Street
Lewisburg, PA 17837

Mr. Robert D. Park, Instructor
Drafting Technology
Carlisle Area School District
102 Oak Drive
Camp Hill, PA 17011

Mr. Joseph P. Saam, Coordinator
Cooperative Education
Lebanon County AVTS
R. D. #2
Lebanon, PA 17042

Mr. James B. Jones, Student
Foundry
The Pennsylvania State University
R. D. #2 Fleetwood
Molltown, PA 19522

Mrs. Rose Ann Kublic, Instructor
Nursing
Cumberland-Perry AVTS
106 Cockleys Drive
Mechanicsburg, PA 17055

Mr. Artie D. Kunselman, Instructor
Chemical Technology
Jefferson County AVTS
R. D. #1
Reynoldsville, PA 15851

Mr. Bruce F. Rambler, Instructor
Auto Mechanics
Cumberland-Perry AVTS
520 North Railroad Street
Palmyra, PA 17078

Mr. Gerald L. Seiler, Coordinator
Cooperative Education
Lebanon County AVTS
R. D. #1
Bethel, PA 19507

Mr. James L. Verbeck, Instructor
Diesel Mechanic
Clearfield County AVTS
R. D. #1 Box 551
Philipsburg, PA 16868

Mr. Albert Yanushefsky, Instructor
Electricity
Western Area AVTS
210 East Pike Street
Houston, PA 15342

INTRODUCTION

Much has been said concerning the applicability of the *Occupational Safety and Health Act of 1970* to educational institutions, and there has been more than enough confusion on the matter. Conversely, there has been surprisingly little attention accorded the necessity for teaching students - particularly those pursuing vocational technical type programs aimed at preparing them for occupational careers - about this landmark legislation which bears a significant impact on the working lives of nearly everyone, and oftentimes even less emphasis on the critically important inculcation of desirable work practices (attitudes). In fact, a number of educational programs fail to even mention safety and health. Similarly, many educational institutions need to implement practical programs both to improve their accident experience and to provide a living, working example of good safety and health procedures for their students. In the same vein, educators serving as cooperative education and other work study programs, will find their tasks enhanced greatly given the opportunity of observing and participating in school safety and health procedures and applying them to their continuing appraisal of existing and potential training stations.

With these factors in mind, the ensuing guide is presented - and it is just that - a guide. It attempts to fulfill its reason for existence by treating the *Occupational Safety and Health Act of 1970* in its true status within the context of the myriad of other laws and regulations affecting schools. The success with which this has been achieved depends largely upon its reception on the part of the reader.

A SAFETY AND HEALTH GUIDE FOR EDUCATORS

I. LEGAL IMPLICATIONS

Applicability of the Occupational Safety and Health Act to Schools

The signing of the Federal Occupational Safety and Health Act on December 29, 1970 (it became effective April 28, 1971) resulted in reverberations in all directions; reverberations which are still continuing and will continue through the foreseeable future. A few are those affecting employers, employes; professional, trade, and employe organizations and associations, not to mention governments at all levels.

Speaking of "governments at all levels," school districts are governmental agencies; therefore school districts are affected. The ripples do not stop there; they extend to school employes, both professional and nonprofessional, and there is a spillover to pupils. As for the impact itself; it is reflected in several ways and in combination with a number of other factors. The result is, to say the least, an uncommon complicated situation fraught with an incredible maze, irrevocably wedded, of influences, conditions, laws, responsibilities, practices; some of them unique in themselves. Because of its inherent nature, vocational technical education is involved to greater extent than its partners in the total education community, but none are exempt.

The purpose of the ensuing treatment is to at least organize the maze by affording a recognition and understanding of the elements comprising the skeins within the pattern context, and then to afford a means of coping with them.

Schools Basically Excluded

By way of a start, the Occupational Safety and Health Act's thrust is aimed primarily at "Workplace America" - the (approximate) sixty million employes and six million establishments in which they work - and, of course, the employers who operate the establishments. Conversely, Federal, State, and Municipal employes are excluded. Inasmuch as school employes, both professional and nonprofessional, are public employes, they are also excluded - that is, usually - but not always. The determining factor is whether or not there is a state plan in operation.

Inclusion Through State Plans

The *Occupational Safety and Health Act* contains a number of provisions, one of them according states the prerogative of administering their own occupational safety and health program. A major requirement is the submission

of a plan for such administration by a state and its approval for, and subsequent, implementation.[1] The plan must propose a program at least as effective as that mandated (particularly the standards) under terms of the *Occupational Safety and Health Act* (OSHAct); additionally it must also contain provisions for the coerage of state and municipal employes. In states where there is a state occupational safety and health plan in operation, then, public education and school employes are included. Pennsylvania does not have a state plan; therefore, the Act is not applicable to any component of Pennsylvania public education, whether elementary, secondary, or postsecondary. The OSHAct, however, is applicable to all segments of private education, regardless of level or location, in all states (including Pennsylvania) whether or not there is a state plan in operation.

Student Applicability

Every statement in the foregoing paragraph is true except that describing applicability of the OSHAct to public education; however, it is almost entirely true. It must be kept in mind that the Act pertains to employers and employes. Therefore, even where it is applicable to public education (*i.e.*, where a state plan is in effect), it would not apply to students, because students are not employes. In the case of cooperative education programs, though, students at training stations are actually employes in workplaces subject to the OSHAct. The same is true of certain vocational work study programs. It would appear that the similarity also holds for students engaged in work experience programs; however the multi-faceted divergencies of these negates any attempt at generalization. It may be that the evolution of a definitive statement with respect to this lies in the courts, if or when a relevant case is heard and decided.

Modified State Plan Inclusion Potential

There is one additional potential means by which public educational institutions in Pennsylvania - or any state not having an approved plan for administering an occupational safety and health program in effect - could become subject to provisions of the *Occupational Safety and Health Act*. This is through what amounts to a modified, or partial, state plan limited to public - state, county, and municipal - employes. The Occupational Safety and Health Administration (OSHA) Solicitor has ruled that such an arrangement would be eligible for approval and funding under the state plan provision [50 percent of the cost of administering approved state safety and health programs is reimbursed by OSHA], and it is currently undergoing the official OSHA approval process. Sixteen states, among them Pennsylvania,[2] have

---

1. Congress of the United States, "Section 18: State Jurisdiction and State Plans," *Occupational Safety and Health Act of 1970* (P.L. 91-596), p.19. Washington, D. C.: U. S. Government Printing Office, 1973.

2. Bureau of National Affairs, Inc., "Public Coverage in State without Plans is in New OSHA Proposal, "*Occupational Safety and Health Reporter*. Vol. 5, No. 48 (April 18, 1976), p.1444. Washington, D. C.: The Bureau.

signified their interest in this possibility. Should the program become a reality, public education in the Commonwealth could conceivably become subject to provisions of the *Occupational Safety and Health Act* or similar ones [the Act requires states to implement provisions at least as effective as those of OSHA] at any time.

Inclusion Under Pennsylvania Laws

While professional (as well as nonprofessional) employes of the public education community in Pennsylvania are, in fact, excluded from coverage by the OSHAct and its provisions, they and their employers are subject to a number of other laws, regulations, and conditions. Among these are the multiple Commonwealth of Pennsylvania laws, regulations, and conditions.

General Safety Law

First and most basic is the *General Safety Law* (Act No. 174, May 18, 1937, P.L. 654), which was enacted long before the Federal Occupational Safety and Health Act. Its stated purpose is:

> to provide for the safety and to protect the health and morals of persons while employed; prescribing certain regulations and restrictions concerning places where persons are employed, and the equipment, apparatus, materials, devices and machinery used therein; prescribing certain powers and duties of the Department of Labor and Industry relative to the enforcement of this act; and fixing penalties . . . [1]

The law indicates it pertains to 'establishments' and defines these as:

> . . . any room, building or place within this Commonwealth where persons are employed or permitted to work for compensation of any kind to whomever payable, except farms or private dwellings; and shall include those owned or under the control of the Commonwealth, and any political subdivision thereof, as well as school districts . . . [2]

Boiler, Elevator, Fire and Panic Laws

There are several additional laws similarly applicable to school districts and schools. One of these is the *Boiler Law* (Act No. 451, May 2, 1929, P.L. 1513, as amended; Act No. 475, December 27, 1951, P.L. 1793), which regulates the construction, equipment (including safety), maintenance operation, and inspection of boilers and unfired pressure vessels. Another is the *Elevator Law* (Act No. 69, April 8, 1937, P.L. 277), regulating the

---

1. Commonwealth of Pennsylvania, *General Safety Law*, p.1.

2. *Ibid.*

construction, equipment (including safety), operation and inspection of elevators (among them both passenger and freight elevators, dumb waiters, hoists, escalators). Still another is the *Fire and Panic Law* (Act of April 27, 1927, as amended), which establishes standards for the construction of certain buildings, including schools; provides for the approval of building plans prior to construction, and for inspection at any time. As you have probably already surmised, this is the law which requires the approval of school building plans [although the Pennsylvania Department of Education also has requirements which must be observed, and which will be referred to later] and requires inspection and approval of new schools before they may be occupied.

All the foregoing laws are enforced by the Pennsylvania Department of Labor and Industry as indicated in the reference to the *General Safety Law*. This function is assigned specifically to the Bureau of Occupational and Industrial Safety, Harrisburg, PA 17120. Enforcement, or compliance, is accomplished through a corps of safety inspectors located in Labor and Industry Department District Offices throughout the Commonwealth. The instruments by which compliance or noncompliance are adjudged consist largely of regulations pertinent to and encompassing all the laws. There are also certain specific stipulations contained in the laws themselves.

While the laws treated above contain both safety and health [which should be considered to be synonymous] provisions, the regulations administered by the Bureau of Occupational and Industrial Safety pertain primarily to safety. There is another set of regulations, devoted to occupational health, which is administered by the Bureau of Occupational Health in the Pennsylvania Department of Environmental Resources, Harrisburg, PA 17126, through a corps of industrial hygienists located at departmental district offices throughout the Commonwealth. These regulations are likewise based on laws, among them the health provisions in the *General Safety Law*.

Department of Education; School Code

As previously indicated, the Pennsylvania Department of Labor and Industry is not the sole agency concerned with the inspection and approval of school buildings and their plans. The Department of Education is similarly responsible for approval and inspection of school buildings and plans; indeed so are several additional Commonwealth agencies. With respect to inspection and approval, Department of Education responsibilities, as prescribed in the *School Laws of Pennsylvania*,[1] concern regulations treating (1) substantiated building need; (2) building cost; (3) site selection and size; (4) space allocation and design; (5) environmental factors; and (6) health and safety. The approvals are also required for renovation and alteration of buildings

---

1. Commonwealth of Pennsylvania, Department of Education, *School Laws of Pennsylvania*. (1963 Revision) Harrisburg, Pennsylvania, 1949.

beyond ordinary repairs. Standards setting forth requirements for school buildings in keeping with the *School Code*[1] and regulations of the State Board of Education have been developed by the Pennsylvania Advisory Committee on School Building Standards for the guidance of all concerned. Furthermore, since the preceding statements refer to the *School Laws of Pennsylvania*, it should be said that a number of standards and requirements refer to aspects of safety and health, among them rules for the conduct and operation of schools (including safety patrols); school health services for pupils and employes, vaccination, and communicable disease control; standards for light areas, floor space, cubical contents, heating, ventilation, construction (fireproof), lighting, and sanitary facilities; teaching of physiology and hygiene, and safe driving of motor vehicles; employment of minors; transportation of pupils; and building and school bus safety.

The discussion thus far has been limited to an overview of federal and commonwealth safety and health laws and their applicability. By way of summary, it should be said that the federal *Occupational Safety and Health Act* and the respective Pennsylvania laws (*General Safety Law, et al*), other than the School Code, apply primarily to employers and employes (including school districts and professional and nonprofessional school employes, as applicable) save for those instances citing school-related pupil employment. The School Code, on the other hand, applies only to school districts, professional and nonprofessional employes, pupils, singly or collectively, as the case might be, as well as to facilities, programs, and the like.

Now let us turn to another consideration of safety and health as it involves schools, educators, and pupils.

School-Educator-Pupil Relationships

Legal Implications

School-educator-pupil relationships are, to say the least, multi-faceted; interwoven throughout these are threads of liability, accountability, and responsibility. The mere mention of these has come to invariably associate them with another form of legality: litigation.

Liability

Traditionally, school districts have been protected from suit for negligence (liability) because of common law immunity. This has tended to afford some measure of similar protection to administrators, as agents of boards of education. Administrators, however, are liable for personal acts of negligence or wrongdoing under general provisions of tort law. Therefore, where administrative duties call for the establishment of rules and regulations

---

1. Codification of the *School Laws of Pennsylvania*, commonly designated the "School Code (of 1949)."

for adequate supervision (in this context, safety and health, or more specifically, pupil injury and health impairment), failure to do so may be negligence. By virtue of their close association with students, teachers have been by far the most often charged as defendants in pupil injury actions (alleging negligence). However, all the foregoing has been undergoing significant change. A number of states have abrogated common law immunity. Pennsylvania has not; however the common law immunity of school boards from suit has disappeared in the Commonwealth as the result of another major instrument of change: the courts. A 1973 Pennsylvania Supreme Court decision abolished the doctrine, declaring that local governmental entities, including school districts, would be liable for their torts and those of their employes.[1]

Accountability

The situation regarding accountability is similar. Some states have enacted educational accountability laws; Pennsylvania has not. However, more and more definition of this factor continues to emerge from the courts. The landmark case, yet to be resolved, is that of "Peter Doe;" a million-dollar suit against the San Francisco Unified School District, its Board of Education and Superintendent of Schools; the California State Department of Education, State Superintendent of Public Instruction, and another 100 defendants (agents or employes of public agencies, including the school district), for " . . . mental distress, pain, and suffering . . ."[2] because of limited ability to read and write. The Peter Doe decision, when arrived at, will make a significant impact upon the entire American education community, including as yet unknown implications for pupils, both in the school and other environments, for example, a cooperative education training station or a place of employment following graduation.

Placing the Peter Doe case into a safety and health context, let us suppose a student graduates from a vocational technical school and is employed in the occupation for which he or she was prepared. Sometime after the start of the employment, the individual sustains a disabling occupational injury and files suit against the Commonwealth Department of Education, the school district, and individual administrators and teachers for not having been taught about the condition or action which resulted in the mishap. The concept is exactly the same as that of Peter Doe's contention.

Responsibility

It immediately becomes apparent that the preceding paragraphs and their brief treatment of liability and accountability are heavily saturated with the factor of responsibility. While they infer the question of "who is responsible for what," there are many other aspects to educational responsibility. Here is where the basic responsibility for education and educators should come into focus: the responsibility of preparing young people for life. More

---

1. Pennsylvania Supreme Court, Ayala v. Philadelphia Board of Public Education, 305 A. 2d 877 (May 23, 1973).

2. Gary Saretsky, "The Strangely Significant Case of Peter Doe," *Phi Delta Kappan*. Vol LIV, No. 9 (May, 1973), p.590.

specifically this means preparing them to participate successfully in the real world. Since a predominant part of virtually everyone's life is committed to the performance of occupational endeavor - it has been said that people spend one-third of their lives at work - preparing young people to perform successfully in the real world means further arming them with the knowledge, skills, and attitudes necessary for successful performance in the real world of work. Obviously successful performance, at the very least, indicates satisfactory accomplishment of all the tasks involved in a given occupation without incurring injury or illness, or inflicting them upon others. This extends considerably beyond the scope of the *Occupational Safety and Health Act of 1970*, which is limited to survival in the workplace.

In fact, the existence of safety and health laws, whether federal or state, and their accompanying standards or regulations, is entirely irrelevant to the responsibility of education and educators of all types and specialties and at all levels in preparation of students for life. The responsibility transcends these; it relates to a number of much more basic tenets, among them the school law according the school parental authority over the child.1

Meeting Obligations

The adequate discharge of this responsibility involves a number of planned activities and procedures, all relevant to the imparting of knowledge, skills, and attitudes pertinent to the educational process. One of these is the integration of safety and health into the curricular program, both classroom and shop, or laboratory, as well as the co-curricular program. Integration is of paramount importance; a sure disservice to safety and health is its separation into a distinct entity. Safety and health constitute an integral part of life. They are woven into, not separate or apart from, the activities and behavior of people; therefore they should not be imparted separately.

Another is the development and implementation of mini safety and health programs in school shops and laboratories, mini in the sense that they should comprise models of adequate programs among their industrial-commercial-professional counterparts. They should also constitute a microcosm - and an intrinsic part - of a schoolwide program addressing its total operation, including maintenance, lawn care, lunch program, sanitation, traffic control, busing, and so on.

Last but not least, if the fundamental responsibility of education is to prepare for life, and if that responsibility is primarily accomplished through the inculcation of knowledge, skills, and attitudes [attitudes cited by most sources as being the most important], then there must be a constant, planned emphasis on safe and healthful behavior integrated throughout the total school activity. Here again laws are transcended. The *Occupational Safety and Health Act of 1970* and the Pennsylvania laws dealing with safety and health are all basically environmental, virtually limited to addressing working conditions only. It was formerly believed that at least 85 percent of occupational accidents were caused by the acts of people. This concept has

---

1. Sch 1317, "Authority of Teachers, Vice Principals and Principals over Pupils," *Public School Code*, p.72.

changed; it is now accepted that accidents and health impairments are the result of multiple causes. One source[1] reports mechanical causes (environmental, working conditions) as responsible for three percent of occupational accidents; unsafe acts (human behavior), two percent, with a whopping 95 percent due to a combination of both. Regardless of which concept one might prefer to choose, human behavior, or attitude, clearly constitutes a major cause.

There are two additional factors requiring clarification; both of them pertinent to what has been treated thus far, as well as that which follows throughout this publication.

Commonwealth vs OSHA Regulations

In the discussion on applicability of the Occupational Safety and Health Act of 1970, it was pointed out that, because of the nonexistence of a state plan in Pennsylvania, the Act and its provisions do not apply to public education, whether elementary, secondary, or higher, because the Act does not apply to federal, state, and municipal employes. It was also pointed out that Pennsylvania laws dealing with safety and health, and their accompanying regulations, do apply. Therefore public school districts, intermediate units, and institutions of higher learning are subject to Commonwealth safety and health controls. This means the school environment and personnel - professional and nonprofessional - are subject to these. They do not apply to students, because students are not employes. However, students are being prepared for life; in the case of vocational education, particularly, but all education in general, they are being prepared for occupational careers. Therefore, while the school, its environs, facilities, and employes come under Commonwealth safety and health jurisdiction, students are headed for the world of OSHA. In their preparation for life, then, they need to know and practice OSHA rather than Commonwealth controls. While this pertains primarily to teaching, there are serious implications for the school environment and the facilities it contains. These, then, should comply with the most stringent standards or regulations, Commonwealth or OSHA. Further, it is clear that students must know and understand the existence of both federal and state requirements, and their applicability, as well as the previously described OSHA involvements with respect to cooperative or other work study programs.

Safety and Health Inseparable

The second factor requiring clarification lies somewhat within the realm of definition and refers to the term, safety and health. Within the context of this *Guide*, it is considered entirely in the occupational sense. For example, occupational health would be concerned with the effects of an unfriendly environment upon an employe, such as exposure to harmful chemicals *e.g.*, carcinogens, or noise, heat, dust, and the like, rather than the health aspects in health occupations or health classes except for occupational hazards which might be involved in the pursuit of these occupations.

---

1. Pennsylvania Department of Labor and Industry.

Clarification is also required with respect to the concept of the term, safety and health. Traditionally, there has been a cleavage between safety and health people (educators, engineers, hygienists) tending to separate safety and health, contending each was an individual discipline. However, leading thinkers have for a long time recognized that, in the occupational sense, at least, both safety and health problems and goals were synonymous, and should be considered in that light. The result of an employe succumbing to occupational cancer and one suffering a broken neck from a fall is the same: both are dead. By the same token, both sustained injuries. Therefore an injury should - and will - be, in this *Guide*, construed to mean both a wound, or trauma, or an illness, or health impairment. This kind of a definition was made possible through the enactment of the Occupational Safety and Health Act of 1970, which finally effected a union of the two. This publication will therefore also refer to safety and health in its whole at all times; should a statement occur utilizing one or the other only, both will still be implied, unless used in a self-explanatory context.

II. EDUCATION-EDUCATOR CONSIDERATIONS

Similar to most school activities and services, safety and health matters contain implications for every member of the education community: boards of education, administrators, teachers, other personnel, and students. It is not possible to treat the total scope, much less associated nuances, of these implications here; however those of major proportion are addressed.

Understanding the Laws

No valid or adequate response to safety and health needs can be effected by any member of the education community without at least a general understanding of the law (s) involved on the part of some to an intimate working knowledge on the part of others. Policies must be adopted and decisions made; leadership roles must be assumed; programs must be developed, organized, and implemented; procedures must be established, curricula must be developed and implemented, and the like.

The Occupational Safety and Health Act of 1970

Perhaps the most logical start is with the Occupational Safety and Health Act of 1970. It is basically an environmental law, dealing with working conditions; however it is unique in that concerns injuries (both trauma and health impairments) to employes within the environment. By way of endeavoring to resolve this apparent paradox, it should be said that the law aims to protect the employe by mandating the quality of the work environment and its contents. This is in keeping with its stated purpose:

> . . . to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources . . .[1]

Provisions

The Act contains a number of provisions. One of them concerns the empowering of states to administer their own safety and health programs through submission and approval of a state plan, which has previously been referred to. Other provisions include recordkeeping; enforcement procedures through inspection

---

1. Congress of the United States, "Preamble," *Occupational Safety and Health Act of 1970*, p.1.

and investigation, citation, and penalties; federal agency programs [federal like state and municipal employes, are not covered by the Act; however a Presidential executive order requires all federal agencies to implement safety and health measures at least as effective as those mandated by the Act], training and education, the establishment of a Review Commission and to administer the Act, the Occupational Safety and Health Administration (OSHA) in the U. S. Department of Labor.

Among recordkeeping requirements, the first and foremost is that for the employer to maintain a log of occupational injuries (trauma) and illnesses. This mandates the listing of all employes requiring medical attention, as opposed to first aid, whether time from employment is lost or not. Enforcement procedures center about the inspection of places of employment [usually called workplaces or establishments] by OSHA compliance personnel, officially termed Compliance Safety and Health Officers (CSHO); not inspectors. Except for very few instances, inspections must take place without notice [there are severe penalties for advance warning], and employers must grant admittance to compliance officers. All violations must be reported and listed on citations. Penalties are levied on the basis of the citations, which also stipulate time limits for abatement (correction) of the violations. Citations may be appealed to the Review Commission, as well as to Federal District Courts as a means of further recourse. Training and education responsibilities are divided between two agencies: The Department of Labor's Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) in the U. S. Department of Health, Education, and Welfare. Nominally, OSHA is responsible for short-term training to employers and employes, while NIOSH is responsible for professional manpower development and research. This would indicate that OSHA has the immediate educational responsibility and NIOSH the long range; however both become heavily involved with all forms of educational pursuits, and both produce educational materials. NIOSH also has an occupational health advisory responsibility to OSHA. Of course, the Occupational Safety and Health Administration - OSHA - is the agency, headed by an Assistant Secretary of Labor for Occupational Safety and Health - created by the Act to administer it.

Standards

The most important facet of the OSHAct - its heart - consists of the OSHA standards. It is the standards which are enforced by compliance officers and cited for violation. It is also the standards which state programs and those of federal agencies as well must be at least as effective as.

There are many sets, or groups, of standards, dealing with numerous subjects, among them guidelines for inspections, citations, and penalties; display of the official OSHA poster; recording and reporting injuries (trauma) and illnesses; recordkeeping; accreditation of testing laboratories; on-site consultation; promulgating, modifying, or revoking standards; advisory committees on standards; National Advisory Committee on Occupational Safety and Health; federal agencies; state plans, and the like. There are also similar National Institute for Occupational Safety and Health (NIOSH) regulations. While all groupings are more or less relevant, there are four which have a significant direct bearing on educational institutions, both as to teaching and practice. These are the (1) General Industry, (2) Construction, (3) Maritime, and (4) Agriculture series.

Each group, or set of standards has its own identifying numerical series. That for General Industry is 1910, meaning each individual standard belonging to the General Industry classification bears the number 1910 plus a decimal fraction type of number referring to the specific subject of the standard [for example, the standard for stairs is 1910.24]. The General Industry group has by far the widest applicability; therefore it tends to be the most important to the greatest number of persons. Included under this category are not only manufacturing and nonmanufacturing industry, but offices, schools, churches, retail establishments, commercial enterprises, banks, hospitals, and the like. Should Pennsylvania develop and implement a state plan, either total or the modification covering state and municipal employes only, the 1910 series would constitute the applicable ones [even in the case of vocational agriculture schools, inasmuch as these are schools rather than farm operations *per se*]. Furthermore, most students in schools of all types are headed for careers in establishments which are most likely to be within the General Industry category. In addition, the standards classifications which follow below are all incorporated into the 1910 series by reference, affording it still wider applicability.

The Construction Safety and Health standards, as their designation implies, refer to construction activities of all types. These bear the numerical identifying series of 1926 [using the comparable example - stairways - to that in the general industry discussion above, the specific construction standard for stairways is 1926.500]. If an establishment normally in the general industry category undergoes a remodeling (including enlargement or other building modification), renovation, redecoration, or repair program; that part of the establishment involved becomes subject to the construction, rather than the general industry standards, for the period of time that the project is in progress.. In a vocational technical school, construction trade laboratories, like the preceding agricultural school example, would come under the 1910 (general industry) classification; however home construction projects, commonly pursued by many vocational technical schools, would be subject to the 1926 (construction safety and health) regulations.

Standards pertinent to maritime operations entail five groups of identifying numbers which apply to as many types of dockside undertakings: Ship Repairing, 1915; Shipbuilding, 1916; Shipbreaking, 1917; Longshoring, 1918, and Gear Certification, 1919. While most schools may not have felt any direct need for programs aimed at preparing students for these occupational careers, there are several major ports in Pennsylvania, and there are schools serving those areas. It must also be kept in mind that maritime operations involve many of the same functions and conditions found in other establishments and activities, such as electrical work, carpentry, materials handling, welding, plumbing, hazardous machinery (machine guarding), air contaminants, exposure to toxic substances, and use of cranes, booms, and derricks, to mention a few.

The identifying number assigned the remaining major occupational classification - agriculture - is 1928. Thus far, only a few specific agricultural standards have been established [the federal government uses the term "promulgate"] or proposed. These include housing and sanitation in temporary labor camps, storage and handling of anhydrous ammonia, pulpwood logging, slow-moving vehicles, exposure to organophosphorous pesticides, guarding of

farm machinery, roll-over protective structures for farm tractors, and field sanitary facilities. The pesticide standard was never implemented. It was issued May 1, 1973, was immediately stymied by injunctions, and finally revoked as of August 12, 1974. Meanwhile, another standard pertaining to pesticides was implemented by the Environmental Protection Agency (EPA); however it does not address the same facet of the pesticide problem. The EPA regulation prescribes the licensing of pesticide applicators (accomplished by the Commonwealth of Pennsylvania) and the labeling of the pesticides by the manufacturer. The OSHA standard pertained to safe and healthful re-entry times into sprayed areas by farm employes. This problem still exists and should not be overlooked in educational programs. Several OSHA advisory committees concerned with aspects of agricultural needs are steadily working on the development of additional standards. Meanwhile, blanket coverage continues to be available under the general industry category of standards (series 1910).

There is one more factor of primary importance: the standards are neither complete, nor are they perfect. There are many gaps and gray areas which have not been resolved and may not be resolved for a long time. To cover situations such as this, the OSHAct contains a blanket statement in *Section 5(a)*:

> . . . Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees . . .[1]

Many citations are issued on the basis of this clause whether standards are involved or not, if a "recognized hazard" exists. Because this section of the Act is designated "Duties," the statement is popularly referred to as the "General Duty Clause."

When the Act was signed, on December 29, 1970, there were no standards; however when it became effective on April 28, 1971 (120 days later), there had to be standards, and there were. What happened was the standards which were already in existence were hurriedly reviewed, selected, approved, and implemented as of the effective date of the Act. Most of them were adapted from standards designed for voluntary acceptance by places of employment which were developed by two organizations: The American National Standards Institute (ANSI)[2] and the National Fire Protection Association (NFPA). A primary function of these two bodies is to develop standards of all types which they recommend to employers of all kinds, governmental entities, etc., for voluntary adoption and use. Both employ a committee (of experts) system for developing respective standards, after which they are submitted to others for agreement, criticism, comment, and the like. This generally entails modification and another round of submission, comment, etc. Eventually,

---

1. Congress of the United States, "Duties, Section 5 (a)," *Occupational Safety and Health Act of 1970* (P.L. 91-596), p. 4.

2. This organization was originally known as *American Standards Association* (ASA), and later as *United States of America Standards Institute* (USASI).

agreement, or concurrence, is obtained and the standard is finalized and published. Because of this process, these are called "consensus standards." Additional standards were adapted from those developed by professional and other societies, among them Underwriters Laboratories (UL), Factory Mutual (FM), American Society of Mechanical Engineers (ASME), Compressed Gas Association, American Conference of Governmental Industrial Hygienists (ACGIH), National Plant Food Institute, American Petroleum Institute, National Board of Boiler and Pressure Vessel Inspectors, American Society for Testing and Materials (ASTM), National Association of Plumbing and Mechanical Officials, American Society of Agricultural Engineers, American Society of Heating, Refrigeration and Air Conditioning Engineers, Crane Manufacturers Association of America, Society of Automotive Engineers (SAE), American Welding Society (AWS), Rubber Manufacturing Association, and Institute of Markers of Explosives. Due to their origin, these standards are called "proprietory." There is still one more source of standards, referred to as "Federal." These consist of standards contained in federal laws enacted prior to the Occupational Safety and Health Act. One of the most familiar of these is the Walsh-Healy Act (Contract Work Hours and Safety Standards [known as Construction Safety] Act), from which the construction safety and health standards were adopted.

There are still other federal laws containing safety and health responsibilities which are administered by other agencies, and which have varying degrees of jurisdictional conflict and other interrelationships with the OSHAct and its administration (especially standards). In order to avoid duplication, to improve administrative efficiency, and to enhance relations with all affected, then, agreements or memoranda of understanding have been made toward defining jurisdiction and establishing cooperation between the Occupational Safety and Health Administration (OSHA) and

National Institute for Occupational Safety and Health (NIOSH), HEW;
Extension Service, U.S. Department of Agriculture (USDA);
Animal and Plant Health Inspection Service, USDA;
Food and Drug Administration (FDA), HEW;
Consumer Product Safety Commission;
Small Business Administration;
National Bureau of Standards;
Federal Railroad Administration;
Mining Enforcement and Safety Administration (MESA), U. S. Department of the Interior; and
Environmental Protection Agency.

Not all the problems have been resolved; some may never be, but there is an OSHA task force constantly working toward that end. The same is true of the standards. As has been stated, these are neither perfect nor complete. Therefore, continual efforts are in progress on the part of the American National Standards Institute (ANSI), the National Fire Protection Association (NFPA), other organizations, as well as by OSHA Advisory Committees to improve them. The OSHA effort includes revoking and modifying standards as well as developing new ones. Standards development procedures are slow (ANSI has required a period of up to ten years to produce a standard); thus the potential of early changes and improvements is unlikely. The worst standards problem, however, is the language in which they are produced, making them extremely difficult to understand and interpret. Revising them in the form of lay language would be the greatest improvement which could be accomplished. All in all, there is no doubt but that the standards improvement activity will be a long-term, permanent (never-ending) function.

Pennsylvania Safety and Health Laws

Several of the Pennsylvania laws addressing safety and health have already been referred to as being applicable to schools:

General Safety Law (Act No. 174, May 18, 1937, P. L. 654);
Boiler Law (Act No. 451, May 2, 1929, P. L. 1513, as amended, and Act No. 475, December 27, 1951, P. L. 1793);
Elevator Law (Act No. 69, April 8, 1937, P. L. 277); and the
Fire and Panic Act (Act No. 299, April 27, 1929, P. L. 465, as amended).

Other laws pertain to more specific industries or operational activities.

Manholes (Act No. 467, August 22, 1961, P. L. 1034);
Foundries (Act No. 264, June 1916, P. L. 673, as amended);
Lead Manufacturing (Act No. 851, July 26, 1913, P. L. 1363);
Work in Compressed Air (Act No. 364, July 19, 1917, P. L. 1088);
Explosives (Act No. 537, July 1, 1937, P. L. 2681, as amended);
Use of Explosives (Act No. 362, July 10, 1957, P. L. 685);
Bedding and Upholstery (Act No. 249, May 27, 1937, P. L. 926);
Dry Cleaning and Dyeing Establishments (Act No. 402, May 4, 1949, P. L. 1342);
Liquefied Petroleum Gas (Act No. 475, December 27, 1951, P. L. 1793);
Stuffed Toys (Act No. 372; July 25, 1961, P. L. 857);
Fire Drill Requirement (Act No. 267, June 7, 1911, P. L. 677); and
A Report of Accidents Law (Act No. 408, July 19, 1913, P. L. 843, as amended).

More recently have come the *Pennsylvania Department of Environmental Resources Law* (Act No. 275, December 3, 1970); the *Hearing Conservation Law* (Pennsylvania Code, Title 25, September 6, 1971), and the *Motor Vehicle Noise Limitations Law* (Act No. 6-1972, January 26, 1972, P. L. 58). Also applicable, of course are provisions of the revised *Motor Vehicle Code* (1976). Last but not least is the Commonwealth law mandating the use of eye protective devices by persons engaged in hazardous activities or exposed to known dangers in schools, colleges and universities - the familiar "Eye Law (Act No. 116, July 19, 1965)" - a byword for vocational educators in particular.

There are several additional laws which contain special significance for certain educational programs and functions or services. Among these are the *Beauty Culture Law* (Act of General Assembly, May 3, 1933, P. L. 242, and Act of July 20, 1968, P. L. 208, as amended), which affects cosmetology programs; there is the *General Food Law* (Act of May 13, 1909, P. L. 520, as amended), plus a number of specific laws and regulations, which affect food processing programs; there are also the Department of Environmental Resources regulations addressing food services and eating and drinking places (these are likewise affected by the Federal Food and Drug Administration in the case of interstate operations, and in some cases, by local health board codes). Affecting mortuary services programs is the *Funeral Director Law* (Act of January 14, 1952, P. L. (1951) 1898, as amended), and Department of State Regulations.

Health occupations programs are affected by a number of laws, regulations, and other factors. Among laws are the *Medical Practice Act* (Act No. 190, July 20, 1974), the *Dental Law* (P. L. 216, May 1, 1933, as amended), the *Professional Nursing Law* (P. L. 317, No. 69, May 22, 1951), the *Practical Nurse Act* (P. L. (1935 1211, March 2, 1956, as amended), plus rules and regulations of respective examining boards. There are further the

requirements of the various registries, which are independent of Commonwealth preparation and licensing requirements. In addition, there are regulations of the Pennsylvania Department of Environmental Resources (Bureau of Radiological Health) pertinent to all facets involving the use of radioactive materials and equipment (these apply to all users, whether medical or industrial). Still other Department of Environmental Resource regulations pertinent not only to health occupations programs, but other vocational programs as well, include those with respect institutions, including but not limited to nursing homes, homes for aged, county institutions, maternal homes, day care centers, facilities providing care for dependents, neglected, or delinquent children; hospitals, schools for emotionally disturbed and retarded children, and boarding homes for infants and children.

Pennsylvania Regulations

As indicated earlier, the basic Pennsylvania legislation pertinent to the school safety and health environment is the *General Safety Law*. Section 12 of this Act permits the creation and implementation of "rules and regulations." There are many of these regulations, or standards, which are applicable to public education at all levels [and as referred to on the preceding pages, additional regulations pertinent to specific occupational programs]. The Pennsylvania regulations pose problems somewhat similar to the OSHA standards, *e.g.*, gaps and gray areas.

Unlike the *Occupational Safety and Health Act*, though the *General Safety Law* contains provisions aimed specifically at the control of certain hazards:[1]

Section 2. General Safety and Health Requirements.-

(a) All establishments shall be so constructed, equipped, arranged, operated, and conducted as to provide reasonable and adequate protection for the life, limb, health, safety, and morals of all persons employed therein.

(b) All belts, pulleys, gears, chains, sprockets, shafting, and other mechanical power transmission apparatus, stationary engines, electrical equipment, and apparatus shall be properly guarded to protect workers from injury.

(c) All cranes, joists, steam or electric shovels, plant railroads, and other apparatus or devices used for moving, lifting, lowering, and transporting material shall be designed, constructed, equipped, and operated as to eliminate dangerous conditions.

---

1. General Assembly of Pennsylvania, Act No. 174, May 18, 1937, P. L. 654.

(d) The point of operation of all saws, planers, jointers or other power driven woodworking machines and all power presses, planers, shapers, and other power driven machine tools, and dangerous parts of any other machines or devices shall be provided with guards approved by the [Pennsylvania] department [of Labor and Industry]. Laundry machines, extractors, washers ironers, and other machines or apparatus shall be provided with guards where, because of accident hazard, they are required by the department.

(e) All toxic and noxious dusts, fumes, vapors, gases, fibers, fogs, mists or other atmospheric impurities, created in connection with any manufacturing process, emitted into or disseminated throughout areas where persons are employed in such quantities as, in the opinion of the department ["department" originally referred to Labor and Industry; more recently this paragraph has become one of the bases for regulations administered by the Bureau of Occupational Health, Department of Environmental Resources], would injure the health of employes or create other dangerous conditions, shall be removed as the point of origin, or, where this is impractical, personal protective devices shall be provided and worn by persons subjected to such hazards.

(f) All pits, quarries, mines other than coal mines [these are administered by the Bureau of Deep Mine Safety, Department of Environmental Resources], trenches, excavations, and similar operations shall be properly shored, braced, and otherwide guarded, operated, and conducted as to provide reasonable and adequate protection to workers employed therein.

(g) All building construction, demolition, and cleaning, including window cleaning, shall be conducted in a manner as to avoid accident hazards to workers or the public. Scaffolds, ladders, material hoists, window cleaning devices, safety belts, and other equipment used in such operations, shall be designed, manufactured, constructed, and erected as to be safe for the purpose intended. All stairs, open-sided floors, platforms, and runways shall be provided with proper railings and toe-boards.

(h) When employes, due to the nature of employment, are subject to injury from flying particles, falling objects, sharp or rough surfaces or materials, hot, corrosive or poisonous substances, acids or caustics and injurious light rays or *harmful radioactive materials*, they shall be provided with and shall wear goggles, other head and eye protectors, gloves, leggings, and other personal protective devices (as last amended by the Act of July 13, 1953, P. L. 438).

Section 3. Lighting, Heating, Ventilation, and Sanitary Facilities.- All establishments shall be adequately lighted, heated, and ventilated. Proper sanitary facilities shall be provided in sufficient number for the persons employed, and shall include toilet facilities, washing facilities, dressing rooms, retiring rooms for women, and wholesome drinking water of approved quality.

Section 4. Fireworks and Explosives Plants . . .

Section 5. Floor Space.- The floor space of workrooms in any establishment shall not be so crowded with machinery as to thereby cause risk to the life or limb of any employe. Proper clear aisle space shall be maintained where necessary for employes to walk between machines, equipment or material. Machinery shall not be placed in any establishment in excess of the sustaining power of the floors and walls thereof.

Section 6. Removal of Guards.- No person shall remove or make ineffective any safeguard, safety appliance or device attached to machinery except for the purpose of immediately making repairs or adjustments, and any person or persons who remove or make ineffective any such safeguard, safety appliance or device for repairs or adjustments shall replace the same immediately upon the completion of such repairs or adjustments.

Section 7. Prohibited Use of Dangerous Machinery.- If any machinery, or any part thereof, is in a dangerous condition or is not properly guarded, the use thereof may be prohibited by the Secretary of Labor and Industry or his authorized representative, and a notice to that effect shall be attached thereto. Such notice shall be removed only by an authorized representative of the department after the machinery has been made safe and the requirement safeguards are provided, and in the meantime such unsafe or dangerous machinery shall not be used.

Section 8. Air Space for Workroom.- The owner, agent, lessee, or other person having charge or managerial control of any establishment, shall provide or cause to be provided not less than two hundred and fifty cubic feet of air space for each and every person in every workroom in said establishment where persons are employed.

The Pennsylvania *Fire and Panic Act*[1] contains similar provisions. Its basic requirement, located in Section 1 of the Act, is contained below:

General Requirement.- Every building enumerated in this act, erected or adapted for any of the purposes of the several classes of building covered by the act [schools and colleges are Class I], shall be so constructed, equipped, operated, and maintained, with respect to type of construction and materials used, *fireproofing*, number and type of ways of egress, aisles and passageways, stairs and fire escapes, wall openings, exits and exit signs, doors and doorways, shaftways and other vertical openings, emergency lighting, automatic *sprinkler systems*, fire alarm systems, fire drills, electrical equipment, inflammable and explosive materials, heating apparatus and fuel storage, number of occupants, ventilation, arrangement of seating and standing space, construction and equipment of stages, projection rooms, and dressing rooms, and *all other fire and panic protection* as to provide for the safety and health of all persons employed, accommodated, housed, or assembled therein . . .

---

1. General Assembly of Pennsylvania, Act No. 299, April 27, 1927, P. L. 465, as amended.

Pennsylvania regulations are not categorized in the same manner as the respective groupings of OSHA standards, although both encompass virtually the same subjects; however they are organized and treated differently.

Regulations generally applicable to public education facilities in Pennsylvania are listed below.

Department of Labor and Industry
Bureau of Occupational and Industrial Safety

Abrasive Wheels
Bedding & Upholstery
Blasting Operations
Boilers and Unfired Pressure Vessels
Brewing and Bottling
Building Regulations for Protection from Fire and Panic
Canneries
Cereal Mills
Compressed Air Apparatus
Construction and Repairs
Cranes, Booms, and Hoists
Demolition Work
Dry Cleaning and Dyeing
Dry Color Industry
Elevators, Escalators, Dumbwaiters, and Hoists
Emergency Lighting Systems
Employment Agencies (Private)
Excavations and Constructions
Explosives Manufacturing or Usage
Explosives Storage, Handling, and Use
Fire Alarm Systems
Fire Escapes
Fireworks Manufacture and Storage
Foundries
Grandstands
Head and Eye Protection
Industrial Lighting
Industrial Sanitation
Ladders
Laundries
Lead Corroding and Lead Oxidizing
Liquified Petroleum Gas
Logging, Sawmill, Woodworking, Veneer, and Cooperage Operations
Machine Tools
Mechanical Power Transmission Apparatus
Migatory Farm Labor Camps
Mines other than Coal Mines
Mined Out Areas
Miscellaneous Hazards and Conditions of Employment
Motion Picture Projector Operation
Nitro and Amido Compounds Manufacturing
Nitrocellulose Film, Photographic and X-Ray, Storage and Handling
Paint Grinding, Paint and Varnish Manufacturing
Pits and Quarries
Plant Railways
Powder Boilers and Unfired Pressure Vessels, Repairs by Welding
Power, Foot and Hand Cold Metal Presses
Printing and Allied Industries
Railings, Toe Boards, Open-Sided Floors, Platforms, and Runways
Railroad Sanitation
Spray Coating
Stationary Engines
Stuffed Toys
Textile Industries
Tunnel Construction and Work in Compressed Air
Window Cleaning
Safe Practices Recommendations
Safety Program Development Recommendations

Department of Environmental Resources
Bureau of Occupational Health

- Threshold Limits
  - Duties of Employer and Employe
  - Air Control
  - Confined Space
  - Maintenance of Place of Employment
  - Identification of Hazardous Chemicals
  - Rock Drilling Machinery
  - Threshold Limit Values and Short-Term Limits
- Hearing Conservation
  - Noise Exposure Limits
  - Noise Exposure Surveys
  - Duties of Employers
- Laser Registration
- Exposure to Cancer Producing Substances
- Hygienic Information
  - Guides (98 hazardous substances)

The fragmentary coverage of Pennsylvania laws and regulations applicable to public education on the preceding pages constitutes a bare minimum only of what educators - administrators, teachers, whatever - and other school employes are concerned with in their respective work environments and in pursuit of their functions. In the light of the primary avowed purpose of education: to equip its human charges for life in an environment which is virtually certain to be OSHA-oriented, several new dimensions come into focus. For the teacher, it becomes important to teach OSHA safety and health standards, procedures, and the like. For the administrator, it means accepting the responsibility for achieving an environment meeting the higher of two criteria. For both, it means the willingness to expend the effort needed for attainment of that state. This is doubly important in the event that the Commonwealth may in the future elect to implement either a modified (for state and municipal employes) or a comprehensive state plan for administration of an OSHA-approved safety and health program.

Human Factors

As has previously been indicated, the *Occupational Safety and Health Act* and other legal efforts designed to counteract accidents, injuries, and health impairments are largely environmental in character, dealing almost universally with working conditions. It has also been indicated that, while any effort at reducing occupational tragedy is both commendable and invaluable, the legal approach fails to address the bulk of the problem.

Accidents are the result of multiple causes in almost all cases, but the predominant ingredient cited by authorities is human behavior, usually referred to as "the unsafe act," or "human error." This poses a uniquely significant matter for education and educators, for humans are what education is fundamentally concerned with. If the primary function of all education is preparation for life, then the product of education is people conditioned for participation in life activities. For the vocational educator, preparation for life becomes preparation for occupational careers, but the conditioning element remains constant.

Its primary function is accomplished by education through the inculcation of knowledge, skills, habits, and attitudes, the last named being the most important. Therefore by precept, example, in teaching, and in his or her total relationships with all others, the teacher must constantly be sensitive to the critical role he or she plays with respect to attitudes.

There are other human factors too. The human being is a complicated composite of complexities; an incredible, ever-changing combination of physical, mental, and emotional factors, constantly swayed by all kinds of influences and conditions.

Among physical considerations are sensory factors (vision, hearing, etc.), disabilities, *e.g.*, physical and mental handicaps; chronic - and sometimes incurable - illnesses, such as heart problems, epilepsy, arthritis, allergies, and acute illnesses as headache, colds, and fever; often disregarded or self-treated. There is not only the factor of alcoholism and drug addiction, but what amounts to the same condition temporarily through the use of prescribed medication. In addition, there are conditions and capabilities - or incapabilities - such as fatigue, coordination, alertness, awareness, dexterity, stature, posture, and strength.

A few of the mental and emotional factors to which individuals are constantly subject are fear, love, anger, sorrow, apathy, excitability, intelligence, overconfidence, impulsiveness, aggressiveness, timidity, carelessness, frustration, responsibility, intolerance, predictability, poor morale, poor self-control, effectiveness, initiative, independence, suicidal impulses, motivation, preoccupation, and a host of others, including the converse of the foregoing.

To complicate matters still further, the physical, mental, or emotional state - any one - of an individual, affects the others as well. All are intertwined; all react to a change in one.

To insure the maximum welfare of students, then, the teacher must acquire an intimate understanding of the nature and characteristics of each student and embody this analysis as a constant factor in the assignment of tasks, otherwise the student may be assigned to an accident. The same goes for the foreman in a place of employment. Similarly, the educator should take steps to ascertain possible limitations, physical or otherwise, which might preclude a student from becoming successful in a selected trade or occupation.

But that's not all; there are a host of other considerations involving human behavior and accident experience, and they stem from a more recently emergent phenomenon known as ergonomics, or human (factors) engineering.

By way of definition, these terms apply to design [of machines, equipment, furniture, tools, etc.] for human use. That is to say, human engineering and ergonomics pertain to the application of knowledge concerning human characteristics, capabilities, and limitations to the research and development of machines, machine systems, and environments toward enabling individuals to work and live safely, effectively, and comfortably. More simply, and in the occupational sense, the terms might well be interpreted as the fitting of persons to jobs, or jobs to persons, primarily through engineering.

Jobs are analyzed to determine what takes place, what machines, tools, and materials are used, what is done with them, and the like. To this is related human factors, among them physical fitness, height, weight, age, handicaps, body functions, such as eating, breaks, waste elimination, plus psychological factors, for example fatigue, isolation, or emotion, as well as environmental factors as stress, heat, noise, dust, vibration, lighting, climatic conditions, and the like. There are also factors such as the posture required for job performance, time constraints, decision-making requirements, the physiological and psychological reactions to the effects of work: stress (outside forces) and strain (body response). Still other factors involved include, but are far from limited to physical work requirements (force, load, fulcrum), the body as a structural system, tasks performed best by people as opposed to those performed best by machines, ability to respond to training.

There are still additional factors, among them biological rhythms. One of these is the Circadian, which spans a cycle of approximately 24 hours. During this cycle are rythmic periods involving fatigue, sleepiness, activity, performance, and rest. One factor which serves to disturb the normal pattern among humans is, for example, shift or night work. Another series of cycles, called biorhythm, is likewise gaining credence rapidly. This consists of three cycles: physical (approximately 23 days), sensitivity (approximately 28 days), and intellectual (approximately 33 days). As in the circadian cycle, the biorhythms experience peaks and valleys during their respective cycles. During upsurge and peak phases, for example, there is greater physical energy and stamina in the physical cycle, more stable and positive emotional state in the sensitivity cycle, and more creative thinking and successful study in the intellectual. There are also seasonal cycles, purported to account for more accidents during the summer than winter.

It is fully realized that what has been stated concerning human factors and their massive, deep-seated, inherent relationship to the pursuit of occupations, or the preparation of students for occupational careers, is wholly inadequate, and may consist of an intensely confusing maze. Human factors are a study in themselves; employers and educators both need a better knowledge and understanding of them. For the purpose of this guide, it is hoped the preceding fragmentary discussion will serve to impress the need for the recognition and embodying of human factors and the effect of compatible work environments (the machine adapted to the worker, and *vice versa*) in the selection of students and/or employes, and their work assignments. A machine shop instructor had in his class a tall boy who complained continually about fatigue and headaches when working at his machine. The instructor saw he had to hunch over the machine to operate it. The machine was raised to a comfortable height with the use of removable pipe extensions, and the fatigue, headaches, and complaints stopped. This is a practical example of the value of ergonomics.

True; human factors extend far beyond any law addressing occupational safety and health, but they form a major obligation of the teacher because of the very nature of his function and that of his profession. The same is true to even greater extent for the cooperative education coordinator or all coordinators of work study programs, for their responsibility extends to the training station as well.

III. PROGRAMMING FOR SAFETY AND HEALTH

Definition

Hand in hand with the educational considerations which were addressed in the preceding chapter, there needs to be the constant pursuit of a safety and health program - not only in vocational or industrial arts shops, although vitally important there - but throughout the entire educational environment and its total operation. This means all other classrooms and laboratories - chemistry, physics, biology, business machines and typing, home making, among others - plus offices, libraries, gymnasiums, and operating activities such as maintenance and repair, renovating and decorating, lawn and ground care, lunch programs and facilities, sanitation, and a host of others.

By definition,[1] a safety and health program is "a planned, organized procedure, or set of procedures, designed to prevent occurrences resulting in injuries, illnesses, deaths, property damage, or other adverse effects." In the school setting, it constitutes not only an actual working example of a positive nature to the entire school population, but a practical application of safety and health teachings, not to mention an ongoing teaching and learning situation.

Safety and health programs among places of employment vary from the simple to the highly sophisticated depending on a number of factors like size (number of employes), products, management concepts, among others. Another concept which enters into all is known as the "Three E's," long fostered by the national Safety Council.[2] This concept postulates that all accident prevention programs require ingredient consisting of a combination of three elements, each beginning with the letter E: engineering, enforcement, and education. In the program description which follows, these elements are easily recognizable. It should also be pointed out that the safety and health activity in the school curricular and cocurricular program (shops, laboratories, classrooms, etc.) ideally constitutes a miniature of the total school program.

---

1. R. Wahl, A *Guide to Safety and Health Programming* (unpublished), 1974.

2. The National Safety Council is a private organization dedicated to the improvement of accident [both trauma and health impairment] experience generally. Its members include both state and local safety councils, industries and businesses, other organizations, including schools, and individuals. There are a number of divisions, e.g., construction, foundry, metals, traffic, school and college, family and home, each specializing in safety and health matters in that specific subject. The Council produces general and specific materials of all kinds, including publications, multimedia materials, curricula, and engages in research. It is located in Chicago, Illinois.

When developed and implemented properly, safety and health programs predicated about the Three E's have been very effective, and they continue to be fundamental entities in any such consideration.

A Safety and Health Program Format

A school safety and health program basically entails three broad categories, each concerned with primary and support functions of the school: operations, instruction (curricular and cocurricular), and traffic control. The last named is, in reality, an operational function; however its extent and scope warrant its individual categorization. Similarly, security is an operational function; in large schools, especially institutions of higher learning, this function may warrant individual categorization and handling. Organizationally in the average size school, though, the chart might well approximate that shown on the following page.

Perhaps organizational charts of safety and health programs in places of employment should be shown as well; however to do so would entail innumerable considerations which would only serve to confuse, rather than assist readers. There is the matter of which occupational operation to select over a host of others, or what size operation to select, or what form of organization to select . . . and so on. In reality, there is no one operation, large or small, which can serve as an adequate example to educators in general; therefore none is provided. Instead, all information pertinent to program organization and implementation is provided in narrative form on the ensuing pages.

For educators concerned with work study programs, particularly cooperative education, the situation becomes radically different. While they have no more use for an irrelevant example than other educators, they must be able to recognize the existence (or absence) and assess the extent and effectiveness of safety and health efforts, including organization, in places of employment where students are located. Thus the treatment of program organization and implementation which follows is critically meaningful to them.

Safety and Health Programming

As has been indicated previously, safety and health programs range from the sophisticated to the simple; the latter is treated here because of its adaptability to small operations. All of them, however, consist of components, or program elements, and they are essentially the same. A chart,[1] which graphically presents these in functional manner, follows. It is recommended that readers refer to it while pursuing the remainder of this topic, or in planning and implementing a school program, or in assessing program extent at training stations in work study activities. It should be noted (1) that a portion of the chart is divided into two columns, indicating that both groups of procedures should be simultaneous; and (2) the arrows leading from the final item, "Evaluation," to the first indicate the process is continuous.

---

1. R. Wahl, A *Guide to Safety and Health Programming* (unpublished), 1974.

A SCHOOL SAFETY AND HEALTH PROGRAM FORMAT

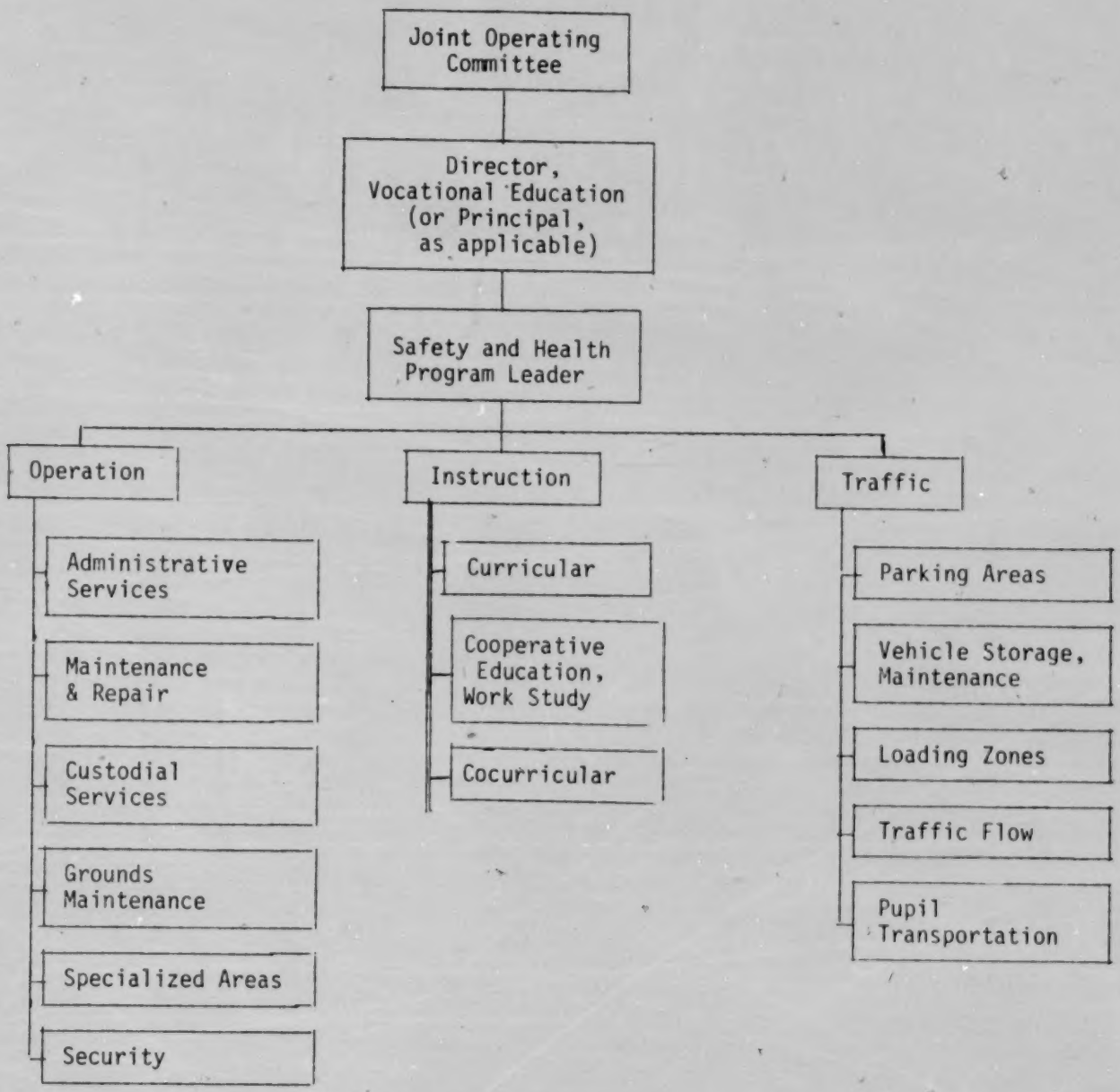


Figure 1.

Nor of the categories shown above have been broken down into their specific components; however these are easily recognizable. For example, the school cafeteria or lunch room constitutes a specialized area. It should also be noted that cooperative education, in fact all work study, is intrinsically curricular; these were categorized separately due to their unique characteristics.

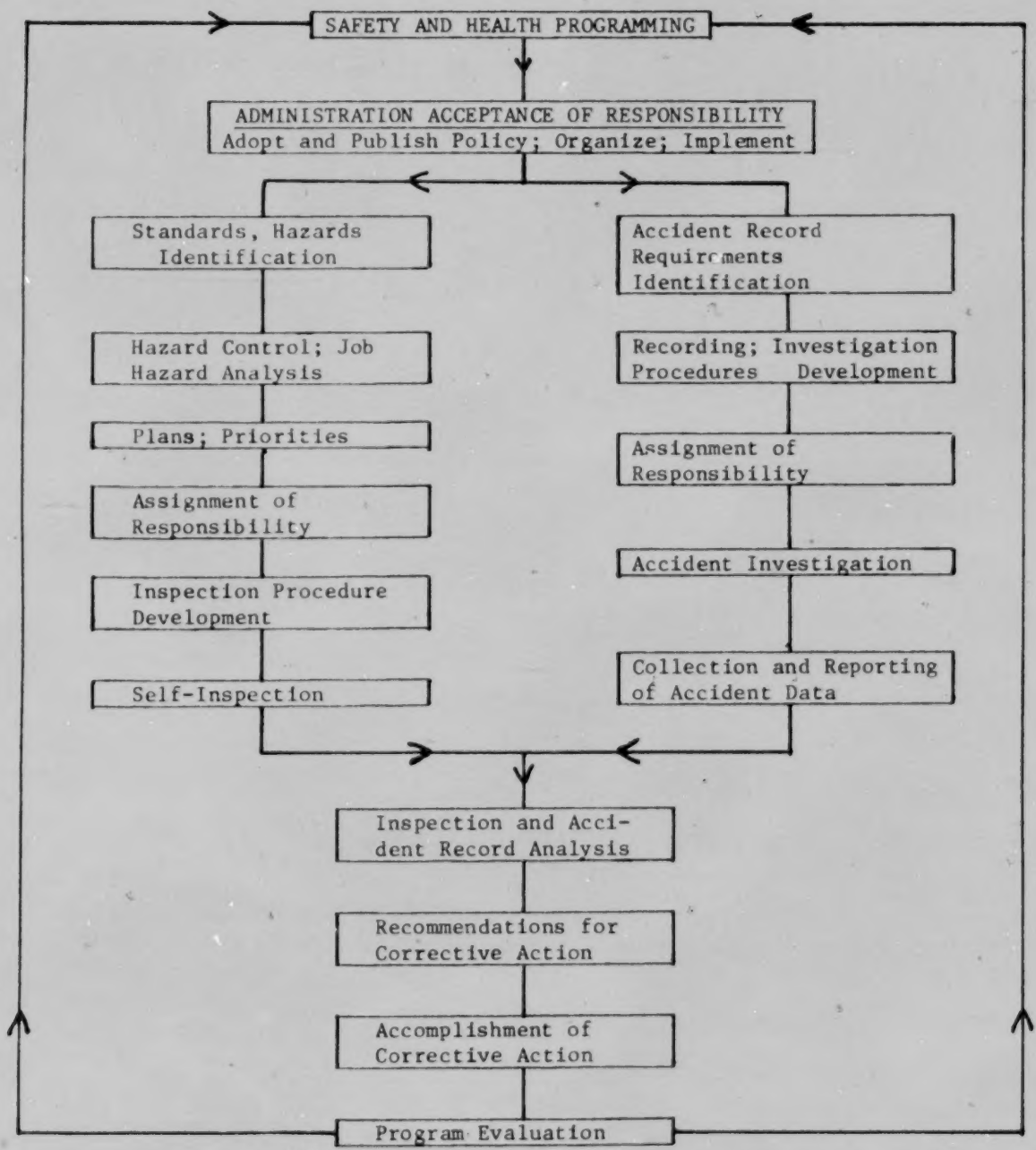

SAFETY AND HEALTH PROGRAMMING
ADMINISTRATION ACCEPTANCE OF RESPONSIBILITY
Adopt and Publish Policy; Organize; Implement
Standards, Hazards Identification
Hazard Control; Job Hazard Analysis
Plans; Priorities
Assignment of Responsibility
Inspection Procedure Development
Self-Inspection
Accident Record Requirements Identification
Recording; Investigation Procedures Development
Assignment of Responsibility
Accident Investigation
Collection and Reporting of Accident Data
Inspection and Accident Record Analysis
Recommendations for Corrective Action
Accomplishment of Corrective Action
Program Evaluation

Figure 2.

Employer Acceptance of Responsibility

This is not only the first step, but also the foremost, the most fundamental procedure, in the development of any safety and health program. The employer directly, whether the board of directors of a large corporation, its president, or general manager, or superintendent, or the combination owner-manager of a tiny operation - or the Joint Operating Committee or Chief School Administrator - or the operator of a truck farm, must accept the responsibility for the safety and health of everyone employed and for the procedures for protecting their safety and health. Other duties and responsibilities can and must be assigned, but this basic responsibility of the employer cannot be delegated.

Equally important is evidence of the acceptance of this responsibility on the part of the employer; evidence that can be shown by adopting and publishing a safety and health policy, by actively planning and organizing the procedures essential to self-compliance. then implementing them, and finally, continuously and fully supporting them.

The policy statement committing the employer to the program and its support may be published in several ways. Several methods are (1) posting it prominently where all employes are sure to notice it; (2) forwarding it to each employe by letter or (3) insertion into pay envelopes; (4) or in the case of schools, publication in the school policy file and/or in [faculty; student] manuals. Among the items the statement should contain are (1) name, title, or designation of the person(s) in charge; (2) designation of responsibilities; (3) integration of the safety and health program into the total operation and the employer's commitment to it; and (4) statements establishing policy and support covering all program aspects throughout the total workplace or environment. A sample statement similar to those formulated by many employers is found in Appendix A.

Standards and Hazards Identification

This procedure entails the identification of hazards, those standards which might be applicable, plus other regulations and/or requirements which may be pertinent. There are two activities, related to environmental and human hazards, respectively, which must be accomplished in the performance of the procedure; both are treated below.

Environmental Hazard (and Standards) Identification: Survey and Analysis

Environmental hazards and such standards as may be applicable are identified through the conduct of a survey and analysis of a workplace or establishment (including schools).

This means the entire work environment - facilities, equipment (machinery, etc.), areas, conditions, processes - must be surveyed and analyzed to determine applicability to standards (comparison is one method), and beyond that, which hazards (whether or not addressed by standards) exist.

As indicated previously, the general industry OSHA standards (series 1910) will ordinarily apply to most industrial, business, and educational environments. In the event of new construction, or addition, alteration, repair, or redecorating, though, the OSHA construction safety and health standards (series 1926) apply for the period of time involved by the activity.

State and municipal building, zoning, and other codes might be applicable as well in many instances; in Pennsylvania, as stated earlier, Commonwealth safety and health regulations pertain to public schools. In agricultural operations, those standards (OSHA series 1928) naturally apply [in vocational agriculture school programs, the 1910 series applies]; depending on the particular activity, though, the general (1910) or construction (1926) standards might be applicable. In dockside or shipyard operations. the maritime standards (Ship Repairing, series 1915; Shipbuilding, 1916; Shipbreaking, 1917; Longshoring, 1918; Gear Certification. 1919) apply to the specific and specialized activities involved. In schools serving port areas (e.g., Philadelphia, Erie), teachers need to be familiar with the maritime regulations and incorporate them into safety and health teaching for the benefit of students finding their way into maritime employment. Similarly, cooperative education personnel must acquire familiarity with these standards in the event of maritime type work study programs or their potential. In construction operations, of course, these OSHA standards are applicable; in like manner, they need to be incorporated into the teaching of the building trades.

Hazards may or may not be related to existing standards. Should a particular hazard be related to a standard, its presence would ordinarily indicate a violation of that standard. Standards, though, are neither complete, nor are they all precise or infallible; therefore there are many gaps and gray areas. This does not mean there are any loopholes for noncompliance; Section 5(a) of the *Occupational Safety and Health Act* specifically mandates that employer must deal with all hazards [this section is also known as the "general duty clause" and may be cited as the basis for violations]. Furthermore, hazards are a constant threat to safety or health - even life - whether they involve a standard or not. It is therefore critically important that no hazard be overlooked in the survey of the workplace.

The essential tool for adequate performance of the survey and analysis is the preparation of a layout containing all objects physically present in a given work or instructional environment. The layout should show the location of all machinery, other equipment, furniture, lighting, electrical outlets [in some instances major outlets only need be shown], master switches, storage areas and type of contents, and the like. All should be identified. Similarly, all other items utilized, such as tools, both hand and [portable] power, and materials, such as chemicals, lumber, metals, wiring, plastics, detergents, sand, foodstuffs, typewriter ribbon, etc., should be classified, if need be, and listed. The layout and list(s) should then be matched with standards to determine applicability and conformance. If there are applicable standards, at least potential hazards will be revealed. Should the condition not meet conformity, the hazard is actual. The recognition of hazards not indicated by standards depends to great extent upon the knowledge and experience of the individual(s) performing the survey.

In an average workplace environment, the survey would ordinarily be conducted by department; in a small shop, however, the entire operation would be included in a single survey. In a school environment, each shop, laboratory, classroom, office, cafeteria, etc., would ideally constitute a unit for survey.

Performance of the survey and analysis constitutes a task which must be assigned to only the most knowledgeable individuals. In a place of employment, these are undoubtedly the foremen or supervisors; in a school they comprise respective teachers and/or supervisors. In a large or extensive operation, the task should be performed by a team, which should include the foremen, or supervisors, of each component part of the whole, plus safety and health specialists if any. Each team member must be oriented and trained in advance so there is no possibility of anything being overlooked, and so everyone understands his or her responsibilities. The smaller the operation, the smaller the team; in the case of an enterprise employing only a few individuals, it will probably be the owner-manager who performs the task.

Human Hazard Identification: Job Hazard Analysis

Most experts agree that injuries - including occupational illnesses - result from multiple causes; they also agree that a predominant cause is behavioral, as exemplified by the expressions, "unsafe act," or "human error," commonly associated with the treatment of that subject. Inasmuch as the Occupational Safety and Health Act is environmental in nature, it really fails to attack the primary source of the problem. In the performance of its fundamental role - preparation of students for life - the school is integrally concerned with human factors; it must perforce extend far beyond the Act and deal with this problem. This subject has already been treated; here an additional aspect is discussed.

A factor of considerable proportions is the manner in which work is performed by the worker - or student - as the case may be. While there are innumerable personal tangible and intangible considerations which enter into work performance, one method of confronting this problem with a great deal of success is known as the Job Hazard Analysis.[1] It is a surprisingly simple procedure in view of the highly complex matter of human factors with which it deals; however it entails a considerable volume of time and preparation. Among places of employment, the job hazard analysis is almost universally prepared by the foreman or front line supervisor; in schools, the ideal preparer is the teacher or instructor. The teacher or instructor, in fact, constitutes a close counterpart to the industrial foreman or supervisor in safety and health considerations, at least. As for the cooperative education or work study coordinator, the existence or nonexistence of job hazard analyses and, if existent, their completeness and quality, afford another excellent indicator as to the status of safety and health emphasis in any given establishment.

It could be said that the job hazard analysis is somewhat akin to the survey of the work environment in that it too involves standards and hazards identification. This is true; however the job hazard analysis, or JSA [which stands for job safety analysis, as explained earlier], as it is commonly referred to in places of employment, is deeply concerned with the manner in which work is performed - the actions - by the human inhabitants of the work environment.

---

1. The Occupational Safety and Health Administration (OSHA) apparently prefers the designation stated above (*Job Hazard Analysis*). This procedure has long been an integral ingredient in safety and health programming among employers, where it has traditionally been, and continues to be, known as *Job Safety Analysis*. The educator should be aware of both terms and recognize them as being synonymous.

Basically, job hazard analysis consists of three elements:

1. breaking down the tasks[1] to be performed by people into their component parts;
2. determining the hazards which are involved, both with respect to machinery or equipment used, and the actions of persons, which could result in injury, illness, death, property damage, work interruption, or a combination; and
3. determining what needs to be done to eliminate or otherwise control the hazard.

There is no specific format for the preparation of the job hazard analysis. As may be seen from the above, a simple, three-column format would appear satisfactory. A number of employers add a fourth column for varying reasons, among them a place to list accidents occurring with respect to that particular activity. It is also recommended here that a four-column format be employed, with the fourth column citing the appropriate OSHA standard, if any be applicable. A diagram of this format appears on the next page. Appropriately, then, there is a fourth element:

4. citing the relevant OSHA standard(s), if any.

In order to perform the job hazard analysis adequately, a complete list of every task, or activity, undergone in the work - or shop, laboratory, classroom, school operational - environment should be made, and the job hazard analysis prepared for each.

Hazard Identification and Correction

As has been indicated, the accomplishment of the workplace, or school survey and analysis should reveal where environmental hazards - deficiencies - exist and which standards are involved. It may be assumed that deficiencies related to existing standards constitute violations; other workplace hazards may also ordinarily be construed as violations, inasmuch as, in the event of OSHA inspection, hazards not covered by standards are subject to citation under Section 5(a) of the OSHAct (General Duty Clause). Similarly, hazards associated with the performance of work, as well as additional environmental hazards, if any, should be revealed through the conduct of the job hazard analyses. If performed properly which activity is in progress, the job hazard analyses will lend invaluable insight into factors such as worker, or student, work practices, habits, attitudes, and other individualities. Information gleaned from both the (1) survey and analysis of the workplace,

---

1. The term "task" is employed here to avoid possible complications from using that of "job" or "operation" in the context of vocational education. Task, as utilized above, should be interpreted as every distinct activity undergone in the performance of assigned duties. Thus, it would pertain more closely to operation rather than job, but with some differences tending to extend both ways (upward and downward) from the general concept of an operation.

JOB HAZARD ANALYSIS

JOB/TASK: _____

Job/Task Components	Hazards	Abatement	Standard(s)

Figure 3.

(2) job hazard analyses will afford an accurate assessment of the total situation and enable adequate countermeasures to problems and weaknesses. The most common of these is known as hazard control, sometimes referred to also as hazard elimination and control.

Hazard control consists of three components, or more properly, methods for eliminating or otherwise controlling hazards. In the order of their desirability, these are:

1. engineering controls;
2. administrative controls; and
3. personal protection.

The engineering solution consists of actually eliminating a hazard by physical design, which indicates either new construction or redesign and modification (or reconstruction) of existing facilities. Should this not be possible or feasible, the next best solution - administrative control of a given hazard - might involve the development and implementation of process changes, or rules and procedures, or actions such as mechanical guarding. Some experts divide administrative controls into two categories: administrative controls and isolation. The administrative controls consists of means such as rules and procedures; the isolation comprises the isolation of the hazard from the worker by a shield, or guard which, in effect, protects the machine or condition. If none of the foregoing can be accomplished, the third solution, personal protection, must be implemented. This, in effect, protects or shields the worker from the machine or condition, but usually to less extent than the others. All the solutions, though, may involve the development and implementation of rules, process changes; the need for protective equipment/clothing, and for training and education.

Planning and Priorities

Once the hazards have been identified by the environmental survey and job hazard analyses, the best method(s) for controlling them must be determined, and then accomplished. This, of course, means planning.

It is frequently likely that adequate hazard control might involve comprehensive treatment, including the alteration of physical facilities. Thus, in total consideration of hazard control, it is vitally important that a priority listing for the correction of hazards be developed and implemented. Every employer and school will naturally have their own individual priorities and will rank them in order of importance to them. There is no attempt to rank them here; however some priorities are (1) degree of hazard;

(2) seriousness of the violation;[1] (3) cost of correcting the condition(s); (4) time involved; (5) possible consequences, and the like.

Adequate planning - and priorities - though, cannot be limited to hazard control, howbeit important. They must also incorporate objectives, or goals, methods of achieving them, procedures for matters as accident reporting and investigation; medical, first aid, and other emergency procedures. In fact, there is a need for a complete, overall, or master, plan addressing the total operation. The plan should encompass minimally all the topics treated in this chapter, as illustrated on the functional chart previously referred to. Furthermore, there should be a subplan, or miniature of the master plan, in each department, shop, or major activity of a workplace or school.

Most of all, the planning and prioritizing cannot be limited to a one-time operation; it must be a continuing function. Needs, problems, and other factors involving priorities, for example, will continue to surface. In fact, all the procedures shown on the functional chart must be continuing in nature; a glance at the arrows illustrates this.

Inspection Procedure Development

An immediate, critically important procedure which must be put into practice at the earliest possible moment is the performance of self-inspections. In both places of employment and in schools, these need to be effected in all facets of the total operation; however in schools the need is even greater in shops and laboratories. They must be undertaken as soon as possible as a stopgap: to counteract safety and health hazards while other procedures, for example determination of priorities, are being accomplished. But their need does not end there; the self-inspection must be a continuing activity to insure attaining and maintaining compliance with standards, rules, desirable work practices and the like, as well as to recognize new problems, needs, and other factors for cycling back into the planning function.

---

1. The Occupational Safety and Health Administration defines four categories of violation according to degree of hazard: (1) imminent danger (where death or serious physical harm can occur immediately or in a short time); (2) serious (where death or serious physical harm can result from an exist-condition or situation); (3) non-serious (where an accident or illness has an immediate relationship to the safety or health of employes, but probably not death or serious physical harm); and (4) De minimus (where a violation has no direct or immediate relationship to safety or health; a notice is issued in lieu of a citation). There are several additional categories of violations, *i.e.*, willful, and repeated. Both may be serious or non-serious, etc. Both also indicate knowledge of the condition on the part of the employer and failure to correct, or abate it.

Assignment of Responsibility

The first step in the determination of self-inspection procedures is assignment of responsibilities - or perhaps more appropriately, the delegation of the tasks - for their development. This requires an intimate knowledge of all the tasks performed, all other factors, hazards involved, and pertinent standards [the identical information resulting from performance of the previously treated environmental survey and analysis and the human hazard identification procedures]. In a large or medium undertaking, the responsibility might well be extended over several layers of management; virtually in all cases, though, the preponderance falls upon the shoulders of the person(s) most familiar with any given activity: the supervisor or foreman in a place of employment. In schools, the counterpart is the teacher. In the case of a small operation, the responsibility is almost certain to rest with the owner personally, or with his personal representative (manager).

Checklist Development

A checklist for use as a self-inspection guide should be developed for each element, or component, or unit part of an operation. If properly developed, it is an exceedingly valuable tool in that it will eliminate the possibility of overlooking factors of any consequence. There is also the possibility, however, that factors which may occur from time to time, and which are not visible on the checklist, may be unnoticed and cause serious consequences. Therefore any checklist, no matter how superb, must be considered in its true light - and used - as a guide only; the trap of accepting and treating it as a hallowed, immutable, infallible document must be avoided. Checklists must constantly be subject to question, review, and possible change. In all events, the checklist must be sensitive to the standards involved and the analyses of the hazards, both job and other. Therefore, the combination of the outcomes of the environmental and human surveys and analyses (Standards and Hazards Identification), treated earlier, should reveal to large extent items needing to become part of the checklist. A sample, all-inclusive type checklist developed by the Utah Board of Education as a guide for teachers is contained in the succeeding chapter. Not all items are pertinent to all teachers; rather teachers should use the items relevant to their respective environments and activities as guidelines in the evolution of their own checklists. Cooperative education coordinators, of course, cannot be knowledgeable in all occupations; therefore they should have available and use checklists developed by respective teachers in assessing training station environments. The same applies to all work study program coordinators and teachers.

Self-Inspection

In the safety and health sense, self-inspection needs virtually no explanation; it means safety and health inspections in a given environment performed by persons assigned from within the organization. There are several additional factors, however, which are so integrally related that they must be considered a part of the total self-inspection activity: who should inspect, types of inspections, inspection frequency, inspection coverage, and inspection routes.

Who Should Inspect

Some employers, usually medium to large, have safety and health specialists who are assigned the function of inspections; in such cases there is no question as to who performs the inspections. Ordinarily, though, inspections should be performed by the individual most familiar with the particular operation. This would almost universally be the person who also developed the checklist(s), participated in the planning, and so on; in other words, the supervisor or foreman in workplaces, and the respective teachers in schools. A shop or laboratory teacher must constantly keep a watchful eye on activities in progress in his or her environment; therefore inspection is a continuous process, and must be. By the same token, other school and employment functions, among them custodial, maintenance, operations, must undergo constant, daily inspections by respective supervisors.

In very small establishments, there may be only one individual in a position of responsibility. He may be the owner, manager, foreman, maintenance supervisor; everything rolled into one. In situations as this, there is no question as to who should perform the safety and health inspection.

Although training and education in safety and health might be a requirement in a number of instances for satisfactory performance, the individuals who are most intimately familiar with their particular operations are the most qualified, and the most logically assigned the inspection function in their respective environments.

Inspection Frequency

It has often been the practice among employers where safety and health programs are in progress that a safety and health inspection is performed each shift by the foreman or supervisor. However, constant inspection is generally considered to be an ongoing part of the supervisor's task. Accordingly, safety and health inspections by the supervisor, teacher, or whatever the actual title or position may be, should be a continuous, ongoing activity. Special inspections, for example maintenance, and other specific inspections required by OSHA standards - there are some - should be held periodically, or on a regular basis, or as a follow-up. Depending upon the safety and health program organization, committee inspections might take place frequently, and could be a valuable tool for revealing hazards which might slip by because of reasons like overfamiliarity. The committee system might also be a valuable means of involving students in the program. Records of all inspections should be kept.

Types of Inspections

In medium to large operations particularly, there is a need for special types of inspections by, for example, the plant engineer, production superintendent, master mechanic, and safety director, or the person serving in that capacity. In small operations, there is probably no one bearing any of these titles or designations; all functions are more logically centered on one individual who might well be the foreman, general manager, president, proprietor, and safety director combined. In an average school, the counterparts of these would include persons as the vocational education director, principal,

department chairpersons, various advisory committees, or a combination of these together with selected teachers. Thought should also be given to student participation.

There are a number of needs for special inspections; one of them stems from an accident, illness, injury, or other untoward event. Another may be related to insurance matters, and may involve special inspection by insurance carrier representatives. In places of employment, there is always the likelihood of OSHA inspections by Compliance Safety and Health Officers; in public education, there is the parallel likelihood of inspection by Commonwealth Bureau of Occupational and Industrial Safety and Bureau of Occupational Health Inspectors. By the same token, if there is an organized safety and health activity involving a committee, or committees, inspections might equally be performed by it or them.

Inspection Frequency

As has already been indicated, constant inspection is an inherent, ongoing part of the supervisor's, or teacher's task. Other inspections, for example maintenance, plus others required by OSHA standards, need to be held periodically, or on a scheduled basis, or as a follow-up. Depending upon the safety and health organization, committee inspections might take place frequently, and could be a valuable tool for revealing hazards which might slip by because of reasons like overfamiliarity. Records of all inspections should be kept.

Inspection Coverage

In general, inspections should cover (1) general conditions, (2) specific operations, and (3) work practices.

As has been emergent from the treatment of the preceding topics, the foreman and his educational counterpart, the teacher, play key roles in the total safety and health function. As the individuals most knowledgeable about their own segment of a total operation, they should have been a fundamental part of the previously discussed workplace survey and job hazard analyses; in fact they should have performed them, particularly the latter. These analyses, and their identification of standards and hazards involving both the workplace environment and processes, should constitute a major consideration in addressing both (1) general conditions (lighting, housekeeping, ventilation, etc.), (2) specific operations (tools, machines, equipment, materials, etc.), and (3) work practices (personal protective equipment, etc.). Work practices, however, involve critically important factors such as attitude, physical, mental, and emotional conditions; fatigues, alcohol and drugs, and the like. Work practices are also affected [but not to any appreciable extent] by Section 5(b) of the *Occupational Safety and Health Act*, which requires safe actions and conduct by employes.

Inspection Routes

There are several opinions as to inspection routes. One favors a prescribed pattern. However, if the route is varied, or can be varied without

losing sight of factors such as a process sequence, for example, it should be changed so as not to be dulled by routine and its accompanying danger of oversight.

Accident Investigation and Recording

The development of procedures to investigate, record, and follow up accidents, illnesses, and injuries is so critical and active that it cannot wait for the procedures just discussed, e.g., identification and control of hazards, self-inspection, etc., to be concluded before it is begun. These matters need to be resolved as much as the others, and as soon as possible; therefore this activity needs to take its place alongside, and simultaneously with, the others. This is why it is located as a parallel activity on the *Safety and Health Programming* chart, shown earlier in this chapter.

Identifying Recording Needs

Accident records are extremely important documents, for several reasons. First, certain recordkeeping procedures are required by the Occupational Safety and Health Administration (OSHA). These include

1. maintenance of a *Log of Occupational Injuries and Illnesses* (OSHA Form 100);
2. a *Supplementary Record of Occupational Injuries and Illnesses* (OSHA Form 101); and
3. a *Summary of Occupational Injuries and Illnesses* (OSHA Form 102).

There are some variations, however. Where there are fewer than eight employes, employers need only maintain records of fatalities. Also, if forms required for workmen's compensation or other insurance contain the same information as do the *Supplementary Record* (101) and annual *Summary* (102), these may be utilized instead of the OSHA forms.

There may be additional recordkeeping requirements. For example, the Pennsylvania Department of Labor and Industry (Bureau of Occupational and Industrial Safety) requires accident reports. Insurance carriers may also require certain reports; these must likewise be considered as part of the requirements. Much of the foregoing reporting requirements is concerned with personal injury; however there are accidents, or incidents, which do not result in injury, but may result in property damage, or work interruption, or have some other negative effect. All these occurrences - including near misses - need to be investigated, recorded and reported. They comprise a most valuable tool toward the improvement of accident experience, if analyzed and the findings applied toward the solution of problems and the avoidance of future accidents, which is the fundamental purpose of accident investigation anyway.

Accident Investigation and Recording Procedures

Once the requirements for recordkeeping have been determined, procedures for their preparation and maintenance should be established. This includes matters as selection of the types of forms (OSHA 101, insurance, compensation, other); their routing, storage, and utilization. If there is a safety

and health organization, or designated head of this function, the records should be maintained there. In some establishments, safety and health records are maintained by the personnel department or officer. In small operations, the employer himself will probably be the only repository of records of any kind. In schools, this function often befalls the school nurse, as is also the case in some companies. Inasmuch as reports of accident investigations constitute an important type of record, the way investigations should be conducted, by whom, and how reported, must be determined along with the development of procedures. The use to which all records are put - their analysis for correction of hazards and prevention of future accidents - must be decided, as well as the extent of the accidents or incidents to be investigated. A decision as to whether all occurrences, or only those required, should be investigated, must be made. The investigation of everything, of course, is preferred because it affords the greatest potential for preventing future - and probably more serious - occurrences.

Assignment of Responsibilities

Like other safety and health responsibilities, the assignment of those for conduct of accident investigations and preparing records and reports, is of paramount importance. All these functions require knowledgeable, competent, individuals. This indicates that, in medium and large operations, the front line supervisor or foreman again looms as a key figure. In a number of establishments, where there are safety and health professionals, these would logically bear the bulk of the assigned responsibilities. In the case of the small employer, though, it would be the owner-operator himself who would undoubtedly bear the investigating and recording/reporting responsibilities. In schools, teachers logically have a major role; however there are responsibilities which must be shared by administrators as well. In all cases, assignment of the investigative and reporting/recording responsibilities may involve the necessity for training to insure adequate performance.

Accident Data Collection and Reporting

The collection of evidence - all the facts and factors involved in the occurrence of an accident - is critically important and covers practically the entire scope of the accident investigation. The same is true of recording these data and factors accurately and meaningfully. Basically, they should answer the questions of who, what, when, where, how, and why.

Analysis of Inspection and Accident Records

It is not only important to have complete and accurate investigations of every accident, incident, or near miss - regardless of whether it requires hospitalization, a band-aid, or nothing - completely and accurately recorded; it is equally important to record - equally completely and accurately - every inspection of every type.

Here is where the two parallel procedures shown on the *Safety and Health Programming* chart contained earlier in this chapter (please refer to chart) come together. The study, or analysis, of these two vital records should

reveal weaknesses, inadequacies, or other factors which, if corrected, will serve to eliminate, reduce, or control hazards - or improve processes or work practices, or all.

Corrective Recommendations

There is no doubt but that the logical sequel to the discovery of weaknesses, inadequacies, hazardous conditions and actions, constitutes the recommending of steps to eliminate, reduce, or otherwise correct them. The *Occupational Safety and Health Act* calls this "abatement."

Abatement Accomplishment

There is also no doubt but that all the analyses and recommendations in the world are worthless - unless there is the actual correction - the follow-up action needed to prevent the recurrence of the same accident, or a worse one, as is often the case. This is the reason for the whole inspection and investigation process: the elimination of violations, hazards, injuries, illnesses, suffering, damage, and costly interruptions.

Program Evaluation

No program of any kind is worth continuing unless it is shown to be effective; safety and health programming is no exception.

Its effectiveness can be measured. One method is comparison. Accidents, injuries, and illnesses occurring over a period of time can be matched against those occurring for a similar period of time in the past; for example, a good indicator would be fewer and less serious accidents during a month, or a year, than during the same month the preceding year or the preceding year itself. Fewer and less serious accidents and injuries or health impairments means less suffering on the part of employes and their families. This should be enough effectiveness for justifying any safety and health program.

A safety and health program should do more, though; it should accomplish both the control of hazards and the accompanying achievement of compliance with standards and work practices. In schools, then, the extent to which a school improves the condition of its environment, and the extent to which students perform - voluntarily - to safe and healthful practices constitutes an accurate measure of program success as well. For the cooperative education, or other work study coordinator, there are other evaluative indicators too. Recognition of substandard conditions and poor work practices by students - or coordinators - in their training stations is certainly an indicator; and there are more.

There are also fringe benefits. Fewer accidents, injuries, hazards, and health impairments imply economic savings, both for the employer and the employe. Likewise implied are fewer work interruptions, time losses, property damage - and those which do occur are likely to be less serious. All these are measurable too.

Program Organization and Implementation

So far, what has been presented in this chapter is an overview of the development of a safety and health program, the elements involved, and the steps or procedures required for its pursuit. This information also serves to enable work study program coordinators to recognize and assess the extent and effectiveness of programs in training stations. Below are some additional aspects with which organizing a program and setting it into motion are concerned.

Integration into the Total Activity

Regardless of any factor concerning the safety and health effort; no matter how limited or far reaching, what type, or who is in charge: it must be an integral part of the total activity with which the industry, business, education program, or other operation is concerned. It cannot succeed if it is brought in and conducted as a separate or independent function.

Responsibility

While responsibilities have been touched on earlier, their acceptance is so critical that some restatement is important.

Every person who is a part of an organized occupational effort, regardless of position - employer, employe, employer representative - bears responsibility for safety and health. According to the OSHAct, all employes are required to comply with standards and other regulations in the pursuit of their tasks. Similarly, employers and their representatives are required to provide work environments free of recognized hazards.

Specifically, the development and implementation of a safety and health program involves responsibilities particularly for the employer. The employer, or chief executive, must be willing to accept the responsibility for the program. In a large operation, it may be the general manager, or president, or chairman of the board; in a small operation, it is doubtless the owner-operator or his equivalent. In a school, it is the board of education or joint operating committee. This is a responsibility which cannot be delegated. The employer must set safety and health policies, stimulate awareness, and show continuing interest, partly through visible, constant support, if others are to follow and cooperate in making conditions safe and healthful. As previously stated, one procedure which is particularly essential, is the publication of a policy actively committing top management to the program. The same interest and attitudes must be reflected by supervisors, and/or other elements of employer representatives which may exist. In departmentalized or functionalized types of organizations, each department head or supervisor, foreman, shift leader, or teacher, must assume leadership for his or her own segment of the operation, and must be given the authority for it. As previously stated on a number of occasions, the key link is thus the front line supervisor, or foreman, or teacher, and in the case of the small operation, the owner-operator. If this individual is to fulfill his responsibilities,

he must be highly trained; the most highly trained in safety and health of any employer representative except where there are professionals, such as safety and health specialists, safety engineers, and/or industrial hygienists.

The Person in Charge

In most instance other than small operations, the employer himself will be unable to take personal charge of the safety and health program. An individual, desirably the most knowledgeable, or whose functions are most closely related, should be designated in charge.

The person most knowledgeable is, of course, a safety and/or health specialist. Such persons exist in many medium and large establishments, as well as to some extent in smaller operations. Where there is a safety and health organization, its head usually carries the title of Director. However, the title might as easily be Vice President, Safety Engineer, Industrial Hygienist, Safety and Health Specialist, or Technician, or Assistant to the Superintendent, or Director, or Principal, for safety and health. In some operations, especially medium to small, the safety and health function is often assigned to the Personnel or Industrial Relations Director, or to individuals as the General Foreman or Master Mechanic. Where there are only a few employes, the owner-operator bears this along with all his other functions.

Types of Organization

Safety and health programming is no different than any other productive activity; it must be organized in some fashion if it is to be effective. Defining and assigning responsibilities and titles are important, but they must be accompanied by a structure or set of procedures for the orderly coordination of the efforts of everyone toward the total goal. Here are the common forms of safety and health programming, with their advantages and disadvantages.

Line Organization

The line organization is especially adaptable to small operations. Here there are usually no assigned, full-time safety and health personnel. These responsibilities, then, are assigned to the supervisors, or foremen, who carry production, maintenance, and other line duties. The overall responsibility stems directly from and on the shoulders of the owner, or manager, or president; whatever his title may be. In very small operations, the owner-operator is probably the only supervisor, and therefore handles safety and health matters personally along with other functions.

Simplicity is an advantage of the line organization in the small operation. Another advantage is that the line organization, by its very nature, tends to integrate the safety and health function as a normal part of the whole operation, as it ideally should be.

The disadvantage of the line organization is the ease with which safety and health attention can slip. Persons assigned health and safety responsibilities must be certain at all times to accord this function the time and

effort required for its accomplishment. It is often easy to overlook safety and health in the press of other matters; there must be constant recognition of this possibility and its avoidance.

Staff Organization

In this form of organization, safety and health matters are handled by a staff of specialists. The staff is headed by a specialist who reports directly to the top official, such as the president or general manager. There are a number of variations in the title of the safety and health head. He may be an assistant to the president for safety and health, or a vice president in charge of safety and health, or a safety director, or be known by some other designation. He and his organization monitor the entire operation, but since they constitute a staff function, have no authority to implement anything. The staff organization accomplishes its purposes through recommendations to the top official, who then determines implementation through the line organization. Members of the staff include such individuals as safety engineers, industrial hygienists, safety and health technicians, statisticians, report writers, and the like. There may also be safety and health committees.

A singular advantage of the staff organization is that the staff, being composed of specialists, contains the capability for developing methods and program elements for eliminating hazards and violations, including training. Another advantage is that the staff can make objective judgments, since they are apart from the line organization. As staff, the specialists are in an excellent position to communicate both with employes and all levels of supervision, including the top.

While there is no doubt that the staff is capable of taking corrective action, there is the disadvantage that such action must generally result from recommendation to the top official. Usually this presents no problem; however in the event of an exceptionally hazardous or imminent danger type condition, there should be authority to correct the condition immediately. Another problem requiring authority the staff organization generally does not possess is the approval of engineering layout and design plans to insure their incorporation of safety and health prior to construction.

Inasmuch as the staff organization is composed of specialists who ideally perform no other functions, it is the logical type organization for large operations. It is also adaptable to medium size operations where functions of the safety and health staff may be assigned as duties shared with others by certain individuals having related responsibilities, for example, the personnel or industrial relations director, project engineer, general foreman, and others. The staff organization is not practical, and may even be impossible, for small operations since it entails additional personnel these can hardly absorb.

Committee Organization

The safety and health committee is marked by two characteristics: extreme flexibility and controversy. The committee organization is indeed flexible. It can be a part of the staff or line organization, or it can constitute the total safety and health organization itself. There can be a

single committee, or there may be a central committee satellited by others. Committees also vary according to membership; some include both employer and employe representatives; others do not. The committee system is also an excellent means of involving student participation in school programs.

Historically, the safety and health committee has been accorded much emphasis, and it is undoubtedly true that the committee organization has been very effective in many operations, both large, medium, and small. However, it is also true that committees are often a means of insuring failure. Responsibilities can be difficult to pinpoint; they can be passed off easily and, unless the right individuals are serving, meetings and activities can degenerate into just going through motions.

Even more controversial is the opinion, advanced comparatively recently, that such committees are not legal. There has, however, been no decision forthcoming on this matter.

Policy governing committees and their functions should be set forth in writing. Some of these are

1. scope of activity;
2. extent of authority;
3. procedures treating
   a. time and place of meetings;
   b. frequency of meetings;
   c. order of business
   d. records to be maintained; and
   e. attendance requirements.

Committees should be advisory in function. If they are to be effective, they should not be concerned with making policy. However, by discussing problems and recommending solutions, they become an instrument for policy development.

Desirably, committees must be given specific tasks to accomplish, and must be effectively administered. Members should consist of key individuals at all levels so as to afford a complete knowledge of conditions and practices. Large groups are unwieldy; committees should be kept small enough to avoid this situation.

As previously indicated, committees can be organized to represent both the employer and employes. In many instances, this is a decided disadvantage. Committees can also become a natural means of communicating attitude and direction to employes. They likewise provide a greater opportunity for more people to participate actively in the safety and health program.

Conversely, committees often move slowly. Meetings are time consuming for many people, and it is easy for committees to become ineffective and inoperative.

Functions and Duties of the Safety and Health Organization

Last but not least, some of the functions and duties the safety and health organization, regardless of type, must perform, include

1. coordinating safety and health activities;
2. planning and directing a self-inspection program;
3. appraising inspections and accident investigations;
4. maintaining inspection and accident record systems;
5. developing educational programs for supervisors and employes and conduct training;
6. stimulating and maintaining employe interest;
7. reporting safety and health performance and accident trends regularly; and
8. insuring that policy is carried out toward achieving
   a. correction of hazards;
   b. compliance with standards;
   c. safe and healthful work practices.

IV. A SELF-INSPECTION CHECKLIST

As indicated in the preceding chapter, a continuing program of self-inspection is critically important in terms of improved safety and health experience. It was further indicated that a checklist is a useful tool in the performance of the self-inspection, and that an instrument of this type, prepared by the Utah State Board of Education recently as part of a guide for teachers,[1] would be presented by way of illustration.

The Utah checklist is superior to many in that most of its statements are referenced to relevant standards. Since Utah is administering its own safety and health program by means of an approved state plan, however, the references to standards are largely to Utah Occupational Safety and Health standards as indicated by the designation UOSHA. Inasmuch as a state plan must be as effective as the federal (OSHA) program, this can be achieved fundamentally by adopting the identical OSHA standards as the respective state standards. In Utah this is predominantly what was done. Therefore, to great extent, the UOSHA standards cited are similar to the federal standards bearing the same numbers.

A really effective checklist, though, must be adapted to an individual operation. Therefore each teacher, for example, should develop an individual checklist for his or her own shop, laboratory, classroom, or whatever, keeping in mind that the checklist which follows here should be used as a guide only. For the work study program coordinator, the checklist serves as another aid in evaluating a training station environment. It follows below.

UOSHA STANDARDS & SAFETY RECOMMENDATIONS

C NC NA[2] A. General:

__ __ __ 1. A Safety and Health Protection on the Job poster must be displayed in a prominent place in the establishment which employes (instructors) normally report to work. OSHA Recordkeeping Requirements.

__ __ __ 2. Employers [local school authorities] must keep an occupation injury and illness report for employes (instructors). OSHA Recordkeeping Requirements.

---

1. Utah State Board of Education, *Industrial Education Safety Guide*, pp. 15-57.

2. The classifications "C," "NC," and "NA" utilized in this checklist are abbreviations for the terms "Compliance," "Non Compliance," and "Not Applicable," respectively.

C NC NA

___ 3. Instructors should conduct regular self evaluations (inspections of their educational programs.)

___ 4. Instructors should initiate and continuously maintain an appropriate safety program.

___ 5. Instructors should have a written statement outlining proper procedures to follow in the event of an accident.

___ 6. Accident reports should be made out as soon as possible after an accident has occurred. Copies of the report should be retained in the instructors' file. Additional copies of the report should be filed in appropriate administrative offices.

B. Buildings:

___ 1. Every building designed for human occupancy shall be provided with exits sufficient to permit the prompt escape of occupants in case of fire or other emergency. (UOSHA 1910.36(b) (1)

___ 2. Each facility shall have adequate toilet facilities which are separated for separate sexes. (UOSHA 1910.141 (c) (1) (ii)

___ 3. All exits shall be clearly visible or the route to reach them shall be conspicuously indicated. (UOSHA 1910.36(b) (5)

___ 4. All exits shall be marked by readily visible signs. (UOSHA 1910.37 (q)

___ 5. It is recommended that a minimum clearance of not less than seven feet six inches should be provided over work areas or means of egress. (OSHA 1910.37 (a)

___ 6. Every stairway, floor opening, or pit or floor hole into which a person can accidentally walk, shall be guarded. (UOSHA 1910.23 (a) (1) (8)

___ 7. All flights of stairs having four or more risers shall be equipped with standard stair railings. (UOSHA 1910.23) (d) (1)

___ 8. Classrooms, offices and laboratories shall be lighted with not less than 30-foot candles. Drafting rooms shall be lighted in not less than 50-foot candles.

___ 9. An adequate number of waste receptacles shall be provided and maintained in a sanitary condition. (UOSHA 1910.141 (3)

C NC NA

___ 10. Specific signs must be displayed to define specific hazards of a nature that failure to designate them may lead to accidental injury to workers or to the public. (UOSHA 1910.145 (a)

___ 11. Corridors and storage areas shall be lighted in not less than 10-foot candles. (UOSHA 1926.56 (a)

___ 12. Accident prevention tags are a temporary means of warning and should be used until a positive means can be employed to eliminate the hazard. (UOSHA 1910.145 (4) (f)

___ 13. All shops shall be kept clean and orderly and in a sanitary condition. Cleaning and sweeping shall be done in a manner to minimize contamination of the air. (UOSHA 1910.141 (a) (1) (i)

___ 14. All wall openings from which there is a drop of more than four feet shall be guarded. (UOSHA 1910.23 (b) (1)

___ 15. The Occupational Safety and Health Administration should be contacted when new installations of facilities, material or equipment are made which may endanger the safety or health of employes.

C. Storage Areas

C	NC	NA	
—	—	—	1. Storage of material shall not create a hazard. (UOSHA 1910.176 (b)
—	—	—	2. All storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. (UOSHA 1910.176 (c)
—	—	—	3. Floor areas under material and storage racks should be kept free of stored materials as well as debris, refuse, scrap and other foreign matter.

D. Work Areas

—	—	—	1. Safety zones should be marked off around every work area where there is danger of possible injury.
—	—	—	2. Non-skid type paint or abrasive material should be placed in the work areas of equipment where there is danger of slipping or of receiving injury. Rubber mats around the machines are not recommended.
—	—	—	3. Floors should be kept free of dangerous projections and obstructions and should be kept free from debris, refuse, scrap, oil and other foreign matter.
—	—	—	4. Scrap boxes, strategically placed near scrap-producing equipment or work areas should be used to help keep scrap off the floor and the shop area clean.

E. Color Coding

Safety Color Code for Marking Physical Hazards. (UOSHA 1910.144)

The following safety color codes shall be used for marking physical hazards:

—	—	—	1. R E D: Shall be used as the basic color for the identification of fire protection equipment and apparatus . . . If painting the extinguisher is impractical or undesirable, color should be used on the housing, wall, or support to identify the location of such equipment . . . . (ii) DANGER . . . . (iii) STOP. Emergency stop bars, buttons, or electrical switches on hazardous machines shall be red.

C NC NA

___ ___ ___ 2. O R A N G E: Orange shall be used as the basic color for designating dangerous parts of machines or energized equipment. Orange shall be used to emphasize hazards when enclosure doors are open or when gear bolts, or other guards around moving equipment are open or removed, exposing unguarded hazards.

___ ___ ___ 3. Y E L L O W: Yellow shall be the basic color for designating caution and for marking physical hazards. Solid yellow, yellow and black stripes, or checkers (or yellow with suitable contrasting background) should be used interchangeably using the combination which will attract the most attention . . . .

___ ___ ___ 4. G R E E N: Green shall be used to designate safety and the location of first-aid equipment (other than fire-fighting equipment).

___ ___ ___ 5. B L U E: Blue shall be the basic color for designation of Caution, limited to warning against the starting, use of, or the movement of equipment under repair or being worked upon.

___ ___ ___ 6. P U R P L E: Purple shall designate radiation hazards.

___ ___ ___ 7. B L A C K & W H I T E: Black, white, or a combination of these two shall be the basic colors for designation of traffic and housekeeping markings.

___ ___ ___ 8. Colors shall meet the tests specified in section 3. color definitions, of ANSI 253.1-1967 Safety Color Code for marking physical hazards. (UOSHA 1910.144(b)

F: Signs and Tags

___ ___ ___ 1. Signs and symbols shall be visible at all times when work is being performed, and shall be removed or covered promptly when the hazards no longer exist. (UOSHA 1926.200(a)

___ ___ ___ 2. Danger signs shall be used only where an immediate hazard exists. Danger signs shall have red as the predominating color for the upper panel; black outline on the borders; and a white lower panel for additional sign wording. (UOSHA 1926.200(b)

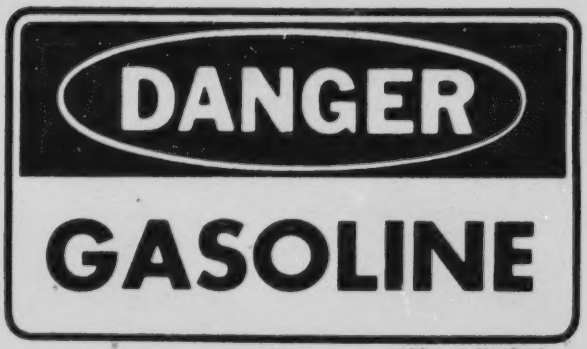


FIGURE 1
DANGER SIGN

C NC NA

___ ___ ___ 3. Caution signs shall be used only to warn against potential hazards or to caution against unsafe practices. Caution signs shall have yellow as the predominating color; black upper panel and borders; yellow lettering of "caution" on the black panel; and the lower yellow panel for additional sign wording. Black lettering shall be used for additional wording. (UOSHA 1926.200(c)

FIGURE 2
CAUTION SIGN

___ ___ ___ 4. Exit signs, when required, shall be lettered in legible red letters, not less than 6 inches high, on a white field [OSHA standards do not require this specific color design but do require red] and the principal stroke of the letters shall be at least three-fourths inch in width. (UOSHA 1926.200(d)

C - NC NA

___ ___ ___ 5. Safety instruction signs, when used, shall be white with green upper panel with white letters to convey the principal message. Any additional wording on the sign shall be black letters on the white background. (UOSHA 1926.200(e)

SAFETY RULES
CAREFULLY READ INSTRUCTION MANUAL BEFORE OPERATING MACHINE.
DO NOT OPERATE WITHOUT ALL GUARDS AND COVERS IN POSITION.
BE SURE MACHINE IS ELECTRICALLY GROUNDED.
REMOVE OR FASTEN LOOSE ARTICLES OF CLOTHING SUCH AS NECKTIES, ETC. CONFINE LONG HAIR.
REMOVE JEWELRY SUCH AS FINGER RINGS, WATCHES, BRACELETS, ETC
USE SAFETY FACE SHIELD, GOGGLES, OR GLASSES TO PROTECT EYES AND OTHER PERSONAL SAFETY EQUIPMENT AS REQUIRED.
STOP MACHINE BEFORE MAKING ADJUSTMENTS OR CLEANING CHIPS FROM WORK AREA
KEEP THE FLOOR AROUND THE MACHINE CLEAN AND FREE FROM SCRAPS, SAWDUST, OIL OR GREASE TO MINIMIZE THE DANGER OF SLIPPING

FIGURE 3
SAFETY INSTRUCTION SIGN

___ ___ ___ 6. Directional signs, other than automotive traffic signs, shall be white with a black panel and a white directional symbol. Any additional wording on the sign shall be black letters on the white background. (UOSHA 1926.200(f)

FIGURE 4
DIRECTIONAL SIGN

C NC NA

___ ___ ___ 7. Blue shall be the standard color for informational signs. It may be used as the background color for the complete sign or as a panel at the top of such types of "Notice" signs, which have a white background. (UOSHA 1910.145(a)

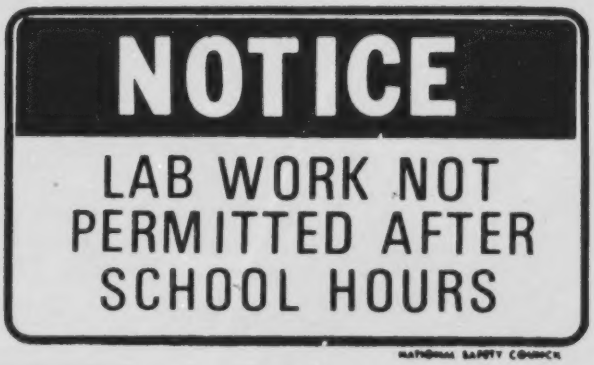


FIGURE 5
INFORMATIONAL SIGN

___ ___ ___ 8. There shall be no variation in the type of design of signs posted to warn of specific dangers and radiation hazards. (UOSHA 1910.145(c)

___ ___ ___ 9. The colors, porportions, and location of the identification panels of each sign shall be in accordance with Table J-1 to J-4. Standard Proportions for Safety Instruction Signs. (UOSHA 1910.145(d)

___ ___ ___ 10. All employes shall be instructed that danger signs indicate immediate danger and that special precautions are necessary. (UOSHA 1910.145(c) (1) (ii)

___ ___ ___ 11. Accident prevention tags shall be used as a temporary means of warning employes of an existing hazard, such as defective tools, equipment, etc. They shall not be used in place of, or as a substitute for, accident prevention signs. (UOSHA 1926.200(h)

FIGURE 6 DANGER TAG

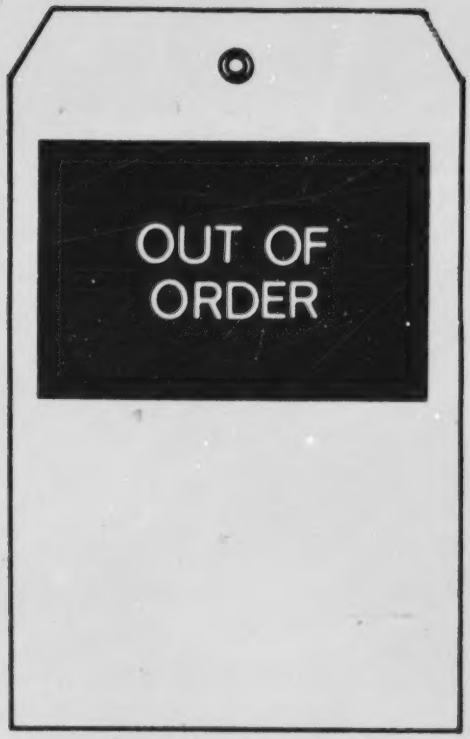


FIGURE 7 OUT OF ORDER TAG

FIGURE 8 DO NOT START TAG

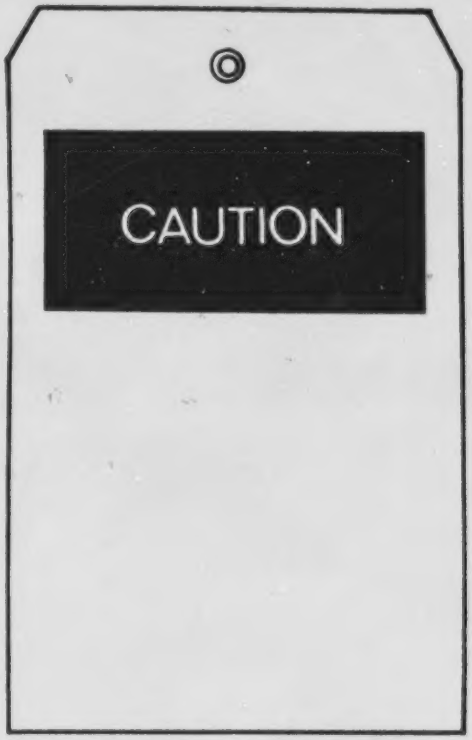


FIGURE 9 CAUTION TAG

G. Personal Protection

C	NC	NA	
—	—	—	1. The employer is responsible for requiring the wearing of appropriate personal protective equipment in all operations where there is an exposure to hazardous conditions. (UOSHA 1926.28(a)
—	—	—	2. The employer shall instruct each employe in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment, to control or eliminate any hazards or other exposure to illness, or injury. (OSHA 1926.21(2)
—	—	—	3. All exposures to any material or substance at concentrations above those specified in the Threshold Limit Values of Airborne Contaminants for 1970, shall be avoided by exhaust of fumes, or protective equipment shall be provided and used. (OSHA 1910.93; 1926.57(a)
—	—	—	4. Safety shoes shall be worn to protect against foot injury where heavy pieces of equipment are handled. (OSHA 1910.94(5); 1926.55(a)-F.R. 1910.94(a) (5) (v)

C NC NA

___ ___ ___ 5. All persons required to work in such a manner that their clothing may become wet shall be provided with such aprons, coats, jackets, sleeves, or other garments for protection. (UOSHA 1910.94(d) (9) (iv)

___ ___ ___ 6. Protection against the effect of noise shall be provided when the sound level exceeds 90 decibels for eight hours per day, 94 decibels for four hours per day, 100 decibels for 2 hours, or 105 decibels for one hour. Exposure to impulsive impact should never exceed 140-decibel peak sound. (OSHA 1910.95(a) (3); 1926.101; 1926.52(a) (d) (e)

___ ___ ___ 7. Where instructors (employes) desire to provide their own protective equipment, the employer shall be responsible to assure its adequacy, including proper maintenance, and sanitation of such equipment. (UOSHA 1910.132(b)

___ ___ ___ 8. Suitable eye protectors shall be provided where machines or operations present the hazard of flying objects, glare, liquids, injurious radiation or a combination of these hazards. (UOSHA 1910.133(a) (1); 1926.102

___ ___ ___ 9. Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employe (instructor). (UOSHA 1910.134(2)

___ ___ ___ 10. Head protection shall be used in any area where there is danger from falling or flying objects, and from limited electrical shock and burn. (OSHA 1910.135; 1926.100

___ ___ ___ 11. Loose clothing such as tails, ties, lapels, cuffs, torn clothing or similar garments which can become entangled in moving machinery shall not be worn where an entanglement hazard exists. (UOSHA Subpart I, Sec. 15.5

___ ___ ___ 12. Wrist watches, rings, or other jewelry shall not be worn on the job where they constitute a safety hazard. (UOSHA Subpart 1, Sec. 15.9

___ ___ ___ 13. Where there is a risk of injury from hair entanglement in moving parts of machinery, employes (instructors) shall confine their hair to eliminate the hazards. (UOSHA Subpart I, Sec. 15.2.3

C NC NA

___ ___ ___ 14. Adequate facilities for maintaining personal cleanliness shall be provided in every place of employment. These shall be convenient for the employes for whom they are provided and shall be maintained in a sanitary condition. (UOSHA 1910.141(d)

___ ___ ___ 15. If an employe is exposed to personal hazard the employer must provide appropriate protective equipment for the employe. (UOSHA Sec. 14.1

___ ___ ___ 16. Whenever protective equipment is provided by the employer, it shall be the duty of each employe (instructor) to use the equipment. (UOSHA Sec. 14.2

___ ___ ___ 17. Avoid inhaling fumes from brass, zinc, galvanized iron, or lead paint.

H. First Aid

___ ___ ___ 1. Employes (instructors) should have a written statement outlining proper first aid procedures.

C NC NA

___ 2. A list of telephone numbers and addresses, from which an emergency service can be secured, shall be posted in a conspicuous place (in classroom or shop buildings) so necessary help can be obtained in case of emergency. This list shall include:

a. Responsible supervisor (school authorities)
b. Doctor
c. Hospital
d. Ambulance
e. Fire Department
f. Sheriff or Police. (UOSHA Sec. 23.2

___ 3. If a clinic, infirmary, or hospital is not nearby, a person must be available who has been adequately trained to render first aid. (UOSHA 1910.151(b)

___ 4. First aid supplies approved by the consulting physician shall be readily available. (UOSHA 1910.151(b)

___ 5. First aid services and provisions for medical care shall be made available by the employer for every employe. (UOSHA 1910.23

___ 6. Any condition that exposes the eyes or any other part of the body to injurious corrosive materials must be supplied with a suitable facility for quick drenching or flushing of the eyes and body. (UOSHA 1910.151(c)

___ 7. Washing facilities, including soap, towels, and hot water shall be provided for all persons required to handle any liquids which may burn, irritate, or may otherwise be harmful to the skin. (UOSHA 1910.94(d)(ix)

___ 8. A green first aid cabinet should be appropriately marked and placed in a conspicuous area in each separately located shop or laboratory. The contents shall have an adequate supply of first aid equipment available for immediate use when needed. The American Red Cross, Salt Lake Chapter, recommends that the following supplies be available in a school first aid cabinet:

(1)	2 units	1 inch Adhesive Compress
(2)	2 units	2 inch Bandage Compress
(3)	2 units	3 inch Bandage Compress
(4)	2 units	4 inch Bandage Compress
(5)	1 unit	3 inch x 3 inch Plain Gauze Pads
(6)	2 units	Gauze Roller Bandage
(7)	1 unit	Eye Dressing Packet
(8)	4 units	Plain Absorbent Gauze (1/2 sq. yd.)
(9)	3 units	Plain Absorbent Gauze - 24" x 72"
(10)	4 units	Triangular Bandages
(11)	1 unit	Tourniquet - Scissors - Tweezers

I. Fire Protection

C NC NA

___ ___ ___ 1. Portable extinguishers shall be maintained in a fully charged and operable condition and kept in their designated places. (UOSHA 1910.157(a) (1)

___ ___ ___ 2. Extinguishers shall be conspicuously located where they will be readily accessible and immediately available in the event of fire. (UOSHA 1910.157(a) (2)

___ ___ ___ 3. The locations and intended use of extinguishers shall be marked conspicuously. (UOSHA 1910.157(a)

___ ___ ___ 4. Extinguishers designed for separate classes of fires shall be marked conspicuously. (UOSHA 1910.157(a) (4)

___ ___ ___ 5. Fire extinguishers suitable for the control of flammable liquid fires must be available, and one portable fire extinguisher having a rating of not less than 12-B units shall be located outside of and not more than ten feet from the door opening of any flammable materials storage room. (UOSHA 1910.106(7)

___ ___ ___ 6. Extinguishers shall be mounted on hangers, or in the brackets supplied, or in unlocked cabinets, or set on shelves. (UOSHA 1910.157(a) (5)

C NC NA

___ ___ ___ 7. The number and size of extinguishers needed to protect a property shall be determined as prescribed in the UOSHA law. (UOSHA 1910.157(c) (1) (i)

___ ___ ___ 8. All extinguishers must be maintained at intervals of not more than one year. They shall be inspected thoroughly, recharged and/or repaired to insure operability and safety. (UOSHA 1910.157(d) (3)

___ ___ ___ 9. The employer (LEA) shall be responsible for the development of a fire protection program. (UOSHA 1926.150(a)

___ ___ ___ 10. Carbon tetrachloride and other toxic vaporizing liquids for fire extinguishers are prohibited. (UOSHA 1926.150 (c) (2) (vii)

___ ___ ___ 11. Any extinguisher removed from the premises to be recharged shall be replaced by a spare extinguisher during its absence. (UOSHA 1910.157(d) (3) (ii)

___ ___ ___ 12. Fire protection equipment of the hose system type shall meet the design requirements of the National Fire Protection Association Standard and OSHA. (UOSHA 1910.158(a) (1)

J. Flammable Liquids

___ ___ ___ 1. Only approved contianers or approved portable tanks shall be used to store flammable liquids or materials, and each portable tank shall be provided with one or more devices to allow venting in case internal pressure becomes too great. (UOSHA 1910.106(d) (2) (i) (ii)

___ ___ ___ 2. Portable cans for flammable liquids must be of no more than 5-gallon capacity, having a flash-arresting screen, spring closing lid, and spout cover so designed that it will safely relieve internal pressure when subjected to fire exposure. (UOSHA 1910.106(29)

___ ___ ___ 3. All solvent waste, oily rags, and flammable liquids shall be kept in fire resistant covered containers. (UOSHA 1926.252(c)

___ ___ ___ 4. Storage cabinets for flammable or combustible liquids must be fire resistant and not more than 60 gallons of flammable or 120 gallons of combustible liquid may be stored in a storage cabinet. (UOSHA 1910.106 (3) (i) (ii)

___ ___ ___ 5. Cabinets for flammable and combustible liquids shall be labeled in conspicuous lettering "FLAMMABLE-KEEP FIRE AWAY." (UOSHA 1910.106(3) (ii)

C NC NA

___ ___ ___ 6. Cleaning solvents shall be restricted to those having flash points of not less than 100°F. (UOSHA 1910.107(g) (5)

___ ___ ___ 7. Storage of flammable and combustible liquids, which are incidental to the work being done, such as automobile assembly or construction of electronic equipment, shall be stored in tanks or closed containers. (UOSHA 1910.106 (e) (2) (i) (ii)

___ ___ ___ 8. All dip tanks containing a flammable or combustible liquid shall have proper ventilation and have automatic extinguishing facilities for 150 gallon capacity or a surface area exceeding 4 sq. ft. (UOSHA 1910.108(a) (b) (5)

___ ___ ___ 9. All liquified petroleum gases must be stored in approved containers and used with approved valves and manifold assemblies. (UOSHA 1910.110(b) (2)

___ ___ ___ 10. When LP gas and other gases are stored or used in the same area, the containers shall be marked to identify their content. (UOSHA 1910.110(b) (5)

___ ___ ___ 11. LP gas hoses shall be fabricated of materials that are resistant to the action of the LP gas in the liquid and vapor phases. (UOSHA 1910.110(b) (9)

K. Compressed Gas & Gas Cylinders

___ ___ ___ 1. The safe condition and arrangement of compressed gas cylinders in the laboratory shall be determined by visual inspection by the employer. (UOSHA 1910.101(a)

___ ___ ___ 2. All compressed gas cylinders or portable tanks shall have pressure relief devices installed and maintained. (UOSHA 1910.101(c)

___ ___ ___ 3. The movement, handling, and storage of acetylene cylinders, acetylene pipe systems, and the generation of acetylene must be in accordance with the Compressed Gas Association pamphlet G-1.4-1966. (UOSHA 1910.102(a) (b) (c)

___ ___ ___ 4. All compressed gas cylinders shall be marked legibly with the name of the compressed gas contained therein. (UOSHA 1910.103(b) (2) (c); 1910.252(a) (2) (i)

C NC NA

5. Compressed hydrogen must be stored in adequately ventilated areas at least 20 feet from any flammable materials or oxidizing gases, and at least 25 feet from any open flame or other source of ignition, and at least 25 feet from any concentrations of people, 50 feet from ventilation intakes or air-conditioning equipment and air compressors, and 50 feet from flammable gas storage. (UOSHA 1910.103(b) (2) (d) (1) (2) (3) (4) (5)

6. Compressed gas cylinders under the control of the employer must be inspected regularly to determine that they are in a safe condition. (UOSHA 1910.166(b) (i)

7. Acetylene shall not be generated nor piped nor utilized at a pressure in excess of 15 p.s.i. gage pressure. (UOSHA 1910.252(a) (1) (ii)

8. Rules and instructions covering the operation and maintenance of oxygen and fuel gas supply equipment, including generators and oxygen or fuel gas distribution piping systems, shall be readily available. (UOSHA 1910.252(a) (1) (iv)

9. Compressed gas cylinders shall be stored away from radiators and other sources of heat. Inside buildings, the cylinders shall be stored in well-protected, well-ventilated dry locations at least twenty feet from highly combustible materials. (UOSHA 1910.252(a) (2) (ii) (a) (b)

10. Storage spaces for cylinders shall be located where they will not be knocked over or damaged by passing or falling objects. (UOSHA 1910.252(a) (2) (ii) (b)

11. All compressed gas cylinders should be secured at all times to prevent accidental damage caused by falling or tipping over.

12. Empty cylinders shall have their valves closed and valve protection caps shall be in place. (UOSHA 1910.252(a) (2) (ii) (c) (d)

13. Oxygen cylinders stored in an outside generator house shall be separated from the generator, or carbide storage rooms by a non-combustible partition. (UOSHA 1910.252(a) (2) (iv) (c)

14. Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials by a minimum distance of twenty feet, or by a non-combustible barrier at least five feet high. (UOSHA 1910.252(a) (2) (iv) (c)

C NC NA

___ ___ ___ 15. Oxygen cylinders or apparatus shall be kept free from oily or greasy substances and shall not be handled with oily hands or gloves. (UOSHA 1910.252(a) (2) (v) (a)

___ ___ ___ 16. Gas cylinders not having fixed hand wheels for their valves shall have keys, handles, or special wrenches on the valve stems while these cylinders are in service. (UOSHA 1910.252 (a) (2) (v) (b) (5)

___ ___ ___ 17. Gas cylinders shall be kept far enough away from the actual welding or cutting operation that sparks or hot slag will not reach them. (UOSHA 1910.252(a) (2) (v) (b) (9)

___ ___ ___ 18. Gas cylinders shall not be placed where they might become part of an electric circuit. (UOSHA 1910.252(a) (2) (v) (b) (10)

___ ___ ___ 19. Gas cylinders shall never be used as rollers or supports whether full or empty, and the number and markings stamped into cylinders shall not be tampered with. (UOSHA 1910.252(a) (2) (v) (b) (11)

___ ___ ___ 20. Only the owner of the cylinder or person authorized by him shall refill a cylinder. (UOSHA 1910.252(a) (2) (v) (b) (13)

___ ___ ___ 21. Unless connected to a manifold, oxygen from a cylinder shall not be used without first attaching an oxygen regulator to the cylinder valve. (UOSHA 1910.252(a) (2) (v) (b) (16)

___ ___ ___ 22. Gas cylinder valves shall not be tampered with nor shall any attempt be made to repair them. (UOSHA 1910.252(a) (2) (v) (b) (18) (i)

___ ___ ___ 23. Fuel gas cylinders shall be placed with valve end up whenever they are in use. (UOSHA 1910.252(a) (2) (iii) (b)

C NC NA

___ ___ ___ 24. Before connecting a regulator to a cylinder valve, the valve shall be opened slightly and closed immediately to blow off sediment in the connection. (UOSHA (a) (2) (1) (b) (18) (ii) (c) (3)

___ ___ ___ 25. Before a regulator is removed from a cylinder valve, the valve shall be closed and the gas released from the regulator. (UOSHA 1910.252(a) (2) (v) (b) (18) (ii) (c) (4)

___ ___ ___ 26. Nothing which may damage the safety device or interfere with the quick closing of the valve shall be placed on top of an acetylene cylinder when in use. (UOSHA 1910.252 (a) (2) (v) (b) (18) (ii) (c) (s)

___ ___ ___ 27. Fuel gas shall never be used from cylinders without reducing the pressure through a suitable regulator. (UOSHA 1910.252(a) (2) (v) (b) (18) (ii) (c) (9)

___ ___ ___ 28. An acetylene cylinder valve shall not be open more than one and one-half turns; preferably no more than three-fourths of a turn. (UOSHA 1910.252(a) (2) (v) (b) (b) (18) (c) (ii) (c) (11)

L. Air Systems and Compressors

___ ___ ___ 1. Every air receiver must have a drain pipe and valve at the lowest point of the receiver. (UOSHA 1910.169(b) (2)

___ ___ ___ 2. Every air receiver shall be equipped with an indicating pressure gage and with one or more spring-loaded safety valves. (UOSHA 1910.169(b) (3) (i)

___ ___ ___ 3. All safety valves on air receivers shall be tested frequently and at regular intervals to determine if they are in good operating condition. (UOSHA 1910.169(b) (3) (iv)

___ ___ ___ 4. Compressed air shall not be used for cleaning except where reduced to less than thirty p.s.i., and then only with effective chip guarding and personal protective equipment. (UOSHA 1910.242(b)

___ ___ ___ 5. Compressed air should not be used for cleaning clothing or machines in industrial education programs.

M. Electrical

NOTE: Items in this section have been extracted from the Federal Register May 19, 1971.

C	NC	NA	
—	—	—	1. UOSHA has adopted the National Electrical Code NFPA 70-1971; ANSI CI-1971 as the Electrical standard. (UOSHA 1910.308(a) Items No. 2 through 25 are referred to in the National Electrical Code.
—	—	—	2. Connections of electrical wires to terminals shall be such as to insure a solid connection without damaging the conductors, and shall be made by means of pressure connectors (including the screw type) or solder. A No. 8 or smaller conductor may be connected by means of clamps or screws with terminal plates having upturned lugs. (UOSHA 1910.310(g)
—	—	—	3. Conductors shall be spliced or joined with approved splicing devices or soldering with a fusible metal or alloy. (UOSHA 1910.310(h)
—	—	—	4. Over-current devices shall be enclosed in cutout boxes or cabinets. (UOSHA 1910.312(e) (1)
—	—	—	5. Fuses and circuit breakers shall be so located or shielded that persons will not be burned or otherwise injured by their operation. (UOSHA 1910.312(f) (10)
—	—	—	6. Extension cords shall be protected against accidental damage caused by traffic, sharp corners, or projections, and pinching in doors or elsewhere. (UOSHA 1926.402 (a) (11)
—	—	—	7. Extension cords shall not be fastened with staples, hung from nails, or suspended by wire. (UOSHA 1926.402(a) (12)
—	—	—	8. Extension cords used with protable tools and appliances shall be of three-wire type. (UOSHA 1926.401(f)
—	—	—	9. All alternating-current systems shall be grounded when they can be so grounded that the maximum voltage to ground does not exceed 150 volts. (UOSHA 1910.314(a) (3)
—	—	—	10. All metal enclosures which are free from ground contact shall be grounded except runs of less than 25 feet. (UOSHA 1910.314(d) (2)
—	—	—	11. All equipment connected by cords and plugs which are liable to become energized shall be grounded. (UOSHA 1910.314(d) (4)

C	NC	NA		
—	—	—	12.	The path to ground from circuits, equipment, and conductor enclosures shall be permanent and continuous, and shall have ample current-carrying capacity to conduct safely any currents liable to be imposed upon it. (UOSHA 1910.314(d) (6) (e) (1)
—	—	—	13.	The grounding conductor of a wiring system shall also be used for grounding equipment. (UOSHA 1910.314(d) (6) (e) (2)
—	—	—	14.	Each flexible cord shall be equipped with attachment plug and shall be energized from an approved receptacle outlet. (UOSHA 1910.316(b) (2)
—	—	—	15.	Flexible cord shall not be used as a substitute for the fixed wiring of a structure for run-through holes in walls, ceilings, or floors, or run-through windows or doorways, or similar openings. (UOSHA 1910.316(b) (2) (c)
—	—	—	16.	Flexible cord shall be used only in continuous length without splice or tap. (UOSHA 1910.316(b) (2) (d)
—	—	—	17.	Flexible cord shall be so connected to the current source and to fittings that tension will not be transmitted to joints or terminal screws. (UOSHA 1910.316(b) (2) (e)
—	—	—	18.	Portable electrically-heated appliances rated at more than 50 watts and reaching temperatures in excess of 121 degrees Centigrade, shall be provided with the underwriter-approved heater cords. (UOSHA 1910.320(b) (1) (i)
—	—	—	19.	Infra-red heating lamps rated at 300 watts or less, may be used with lamp holders of the medium base, unswitched porcelain type. (UOSHA 1910.320(b) (7)
—	—	—	20.	Screw shell lamp holders shall not be used with infra-red lamps over 300 watts rating. (UOSHA 1910.320(b) (7) (ii)
—	—	—	21.	Each appliance shall be provided with a means for disconnection from all ungrounded conductors. (UOSHA 1910.320 (c)
—	—	—	22.	Switches, circuit breakers, motor controllers, and fuses, including push-buttons, relays, and similar devices shall be provided with enclosures, and the enclosure in each case, together with the enclosed apparatus, shall be approved as a complete assembly. (UOSHA 1910.324(d) (2) (f) (1)

C NC NA

— — — 23. Circuit breakers, motor controllers, and switches shall be provided with enclosures approved for their class of operation. (UOSHA 1910.324(d) (2) (f) (1) (i)

— — — 24. By suitable guard or by location, each fixture shall be protected against physical damage. (UOSHA 1910.324(d) (2) (i) (1) (ii)

— — — 24. All electrical devices located in an explosive type atmosphere shall be protected and sealed against arcing which would cause ignition of the atmosphere. (UOSHA 1910.324(d) (1) (i) (2) (ii)

N. Use of Abrasives

— — — 1. Floor and bench mounted grinders shall be provided with rests which are rigidly supported and readily adjustable. Such work rests shall be kept at a distance not to exceed one-eighth (1/8) inch from the surface of the wheel. (UOSHA 1926.303(c) (2)

— — — 2. The concentration of dust or fumes in the breathing zone of an abrasive blasting operator shall be kept below the level specified in UOSHA 1910.93; 1910.94(a) (2) (ii)

— — — 3. Air exhausted from abrasive blasting equipment shall be discharged through dust collecting equipment. (UOSHA 1910.94(a) (4) (iii)

O. Hand Tools

C NC NA

___ ___ ___ 1. Employers shall not issue nor permit the use of unsafe hand tools. (UOSHA 1926.301(a)

___ ___ ___ 2. Wrenches, including adjustable pipe, end, and socket wrenches shall not be used when jaws are sprung to the point that slippage occurs. (UOSHA 1926.301

___ ___ ___ 3. Impact tools such as drift pins, wedges, and chisels shall be kept free from mushroomed heads. (UOSHA 1926.301(c)

___ ___ ___ 4. The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool. (UOSHA 1926.301(d)

P. Jacks & Hoists

___ ___ ___ 1. All jacks shall have a positive stop to prevent over-travel. (UOSHA 1926.305(2)

___ ___ ___ 2. Fluids used in hydraulic-powered tools shall be fire-resistant. (UOSHA 1926.302(9) (d) (1)

___ ___ ___ 3. The operator shall make sure that the jack used has a rating sufficient to lift and sustain the load. (UOSHA 1910.244(a) (1)

C NC NA

___ ___ ___ 4. Respirators shall be worn by all abrasive blasting operators when using silica sand when the nozzle and the blast are not physically separated from the operator. (UOSHA 1910.94(a) (5) (ii)

___ ___ ___ 5. Labs performing dry grinding, polishing, or buffing shall provide suitable hood or enclosures that are connected to an exhaust system. (UOSHA 1910.94(b) (3) (ii)

___ ___ ___ 6. The abrasive wheel guard shall cover the spindle and nut, and flange projections. (UOSHA 1910.215(a) (2)

___ ___ ___ 7. On bench and floor stand grinding wheels, the safety guards shall be such that the exposure of the wheel will not exceed 90 degrees or 1/4 of the periphery. (UOSHA 1910. 215(b) (3)

___ ___ ___ 8. On surface grinders and cutoff machines, the exposed portion of the blade shall not exceed 150 degrees. (UOSHA 1910.215(b) (5)

___ ___ ___ 9. Blotters or compressible washers shall always be used between the flanges of the abrasive wheel. (UOSHA 1910.215 (c) (6) (i)

___ ___ ___ 10. On all grinders, the driving flange shall be securely fastened to the spindle. (UOSHA 1910.215(c) (7)

___ ___ ___ 11. Abrasive wheels shall be mounted between flanges which shall be not less than one-third the diameter of the wheel. (UOSHA 1910.215(c) (1)

___ ___ ___ 12. Before mounting any abrasive wheel; it shall be inspected closely and sounded by the user with the ring test to make sure it has not been damaged. (UOSHA 1910.215(d) (1)

___ ___ ___ 13. When bushings are used in the wheel hole on abrasive wheels, they shall not exceed the width of the wheel, and shall not contact the flange. (UOSHA 1910.215(d) (4)

___ ___ ___ 14. Grinding machines shall be supplied with sufficient power to maintain the spindle speeds at manufacturer rated levels under all conditions of normal operation. (UOSHA 1926.303(a)

___ ___ ___ 15. The maximum exposure of the grinding wheel periphery on portable grinders and sides shall not exceed 180 degrees. The top half of the wheel shall be enclosed at all times. (UOSHA 1910.243(c) (4)

C NC NA

___ ___ ___ 4. All jacks must have a firm foundation, or the base of the jack shall be blocked to prevent slippage. If there is danger of slippage of the object on the jack, it also shall be blocked. (UOSHA 1910.244(a) (2) (i)

___ ___ ___ 5. After a load has been raised, it shall be cribbed, blocked, or otherwise secured at once. (UOSHA 1910.244(a) (2) (iii)

___ ___ ___ 6. Each jack shall be thoroughly inspected every six months. (UOSHA 1910.244(a) (2) (vi) (a)

___ ___ ___ 7. The size of load on any crane or hoist shall not exceed its rated load. (UOSHA 1910.179(n)

Q. Industrial Trucks & Forklifts

___ ___ ___ 1. High Lift Rider Trucks shall be fitted with an overhead guard. (UOSHA 1910.178(e) (1)

___ ___ ___ 2. Concentration levels of carbon monoxide gas created by powered industrial trucks shall not exceed the level specified in OSHA 1910.93. (UOSHA 1910.178(i) (1)

___ ___ ___ 3. Only trained and authorized operators shall be permitted to operate a powered industrial truck. (UOSHA 1910.178 (L)

___ ___ ___ 4. When leaving a powered industrial truck, the high lift shall be fully lowered, controls shall be neutralized, the power shut off, brakes set, and the key or connector plug removed. (UOSHA 1910.178(m) (5)

___ ___ ___ 5. A powered industrial truck shall be kept in safe repair at all times. (UOSHA 1910.178(p) (1)

R. Lead Acid Storage Batteries

___ ___ ___ 1. When changing batteries, facilities should be provided for flushing and neutralizing spilled electrolyte and for adequate ventilation of fumes from gasing batteries. (UOSHA 1910.178(g) (2)

___ ___ ___ 2. Face shields, aprons, and rubber gloves shall be provided for employes handling acids or batteries. (UOSHA 1926.403 (a) (5)

___ ___ ___ 3. Battery charging installations shall be located in areas designated for that purpose. (UOSHA 1926.403(b) (1)

___ ___ ___ 4. A carboy tilter or siphon shall be provided for handling electrolyte. (UOSHA 1910.178(g) (6)

C NC NA

___ ___ ___ 5. When mixing electrolyte, acid shall be poured into water; water shall not be poured into acid. (UOSHA 1910.178(g) (7)

___ ___ ___ 6. When charging batteries, the vent caps should be kept in place to avoid electrolyte spray. (UOSHA 1910.178(g) (9)

___ ___ ___ 7. Smoking shall be prohibited in the charging area. (UOSHA 1910.178(g) (10)

___ ___ ___ 8. Precautions shall be taken to prevent open flames, sparks, or electric arcs in battery charging areas. (UOSHA 1910.178(g) (11)

S. Machine Hazards Guarding

___ ___ ___ 1. Each employer shall be responsible for the safe condition of tools and equipment used by employees, (instructors). (UOSHA 1910.242(a)

___ ___ ___ 2. One or more methods of machine guarding shall be provided to protect the operator and other employes in the machine area from hazards. (UOSHA 1910.212(a) (1)

___ ___ ___ 3. General requirements for machine guards. Guards' shall be affixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible. The guard shall be such that it does not offer an accident hazard in itself. (UOSHA 1910.212(a) (2)

___ ___ ___ 4. The point of operation of machines where operation exposed an employe to injury shall be guarded. (UOSHA 1910.212 (a) (3) (ii)

___ ___ ___ 5. Special tools shall be provided to assist the operator that he may avoid placing his hands in the danger zones. (UOSHA 1910.212(a) (3) (iii)

___ ___ ___ 6. Machines designed for a fixed location shall be securely anchored to prevent walking or moving. (UOSHA 1910.212 (b)

___ ___ ___ 7. All belts, pulleys, gears, shafts, and moving parts shall be guarded, if exposed to contact by employes (instructors) or otherwise create a hazard. (UOSHA 1926.300(b) (c)

C NC NA

___ ___ ___ 8. A control switch must be provided on each machine that allows the operator to turn off the power without leaving his position at the point of operation. (UOSHA 1910.213 (b) (1)

___ ___ ___ 9. On any machine where injury to the operator might result if motors restart after power failure, restarting shall be prevented by means of an automatic cutout switch. (UOSHA 1910.213(b) (3)

___ ___ ___ 10. Equipment or circuits that are de-energized shall be rendered inoperative and have tags attached at all points where the equipment or circuits can be energized. (UOSHA 1926.400(g)

___ ___ ___ 11. All pneumatically driven nailers, staplers, and other equipment provided with automatic fastener feed, which operates at more than 100 pounds per square inch pressure at the tool head, shall have a safety device on the muzzle to prevent the tool from ejecting fasteners unless the muzzle is in contact with the work surface. (UOSHA 1926.302(b) (3)

C NC NA

___ ___ ___ 12. A bandsaw shall be so guarded that the sawblade shall be enclosed except for the working portion of the blade between the bottom of the guide rolls and the table. (UOSHA 1910.213(i) (1)

___ ___ ___ 13. A guard for the blade on the bandsaw shall protect the saw blade at the front and outer side, and this portion of the guard shall be self-adjusting to raise and lower with the guide. (UOSHA 1910.213(h) (5) (i) (1)

___ ___ ___ 14. All bandsaws shall be provided with a tension control device to indicate proper tension. (UOSHA 1910.213(h) (5) (i) (2)

___ ___ ___ 15. Hand-held, power-driven tools shall be provided with appropriate switches for each type of tool. (UOSHA 1910.243(a) (2)-U.S.; 1926.300(d) (2) (3)

___ ___ ___ 16. All portable electric tools must be properly grounded by a separate ground wire and polarized plug and receptacle. (UOSHA 1910.213(a) (11)

___ ___ ___ 17. All pneumatic power tools shall have the operating trigger so located as to minimize the possibility of its accidental operation, and shall be arranged to close the air inlet valve automatically when the pressure of the operator's hand is removed. (UOSHA 1910.243(b) (1) (i)

___ ___ ___ 18. The muzzle end of an explosive-actuated or high-velocity tool shall have a protective shield or guard at least three and one-half inches in diameter mounted perpendicular to and concentric with the barrel, and designed to confine any flying fragments that might otnerwise create a hazard at the time of firing. (UOSHA 1910.243(d) (2) (1) (a)

T. Graphic Arts

___ ___ ___ 1. All roller-type printing machines will be supplied with nip guards. (UOSHA 1910.262(dd) (1)

___ ___ ___ 2. All roller gears shall be provided with a protective disc which will enclose the nips of the inrunning gears. (UOSHA 1910.262(dd) (1)

___ ___ ___ 3. The nip at the inrunning side of all calendars rolls shall be provided with a guard extending across the entire length of the nip and arranged to prevent the fingers of the workers from being pulled in between the rolls. (UOSHA 1910.262(ee)

C NC NA

___ 4. On all rotary staple cutters, a guard shall be installed completely enclosing the cutter to prevent the hands of the operator from reaching the cutting zone. (UOSHA 1910.262(ff)

U. Carpentry, Cabinet-Making

___ 1. Each woodworking machine shall be so constructed as to be free from sensible vibration when the largest size tool is mounted and run idle at full speed. (UOSHA 1910.213(a) (1)

___ 2. Circular saw fences shall be so constructed that they can be firmly secured to the table without changing their alignment with the saw. (UOSHA 1910.213(a) (6)

___ 3. Circular saw gages shall be constructed so as to slide in grooves or tracks that are accurately machined. (UOSHA 1910.213(a) (7)

___ 4. Hinged saw tables shall be so constructed that the table can be firmly secured in any position and in true alignment with the saw. (UOSHA 1910.213(a) (8)

___ 5. It is recommended that each power-driven woodworking machine be provided with a disconnect switch that can be locked in the "OFF" position. (UOSHA 1910.213(a) (10)

___ 6. Exhaust systems for the removal of undesired vapors or dusts shall be in operation continually during all operations which they are designed to serve. (OSHA 1926.57(d)

___ 7. Featherboards or suitable jigs shall be provided wherever standard guarding cannot be used in dadoing, grooving, jointing, molding, and rabbeting. (UOSHA 1910.213(a) (15)

___ 8. On tenoning machines, all feed chains and sprockets shall be completely enclosed and all sprockets and chains shall be guarded at the sides by plates, and each tenoning machine shall have all cutting heads and saws, if used, covered by metal guards. (UOSHA 1910.213(k) (1-3)

___ 9. Each hand-fed saw shall be guarded by a hood, which shall completely enclose that portion of the saw above the table. (UOSHA 1910.213(c) (1)

___ 10. Each hand-fed circular saw shall be furnished with a spreader. (UOSHA 1910.213(c) (2)

C NC NA

___ ___ ___ 11. The upper hood of the radial saw shall completely enclose the upper portion of the blade and include the saw arbor. (UOSHA 1910.213(h) (1)

___ ___ ___ 12. The radial saw used for ripping must be provided with nonkickback fingers or dogs. (UOSHA 1910.213(h) (2)

___ ___ ___ 13. Adjustable stops shall be provided on radial saws to prevent the forward travel of the blade beyond the position necessary to complete the cut. (UOSHA 1910.213(h) (3)

___ ___ ___ 14. The installation of a radial saw shall be such that the front end of the unit will be slightly higher than the rear, so as to cause the cutting head to return gently to the starting position when released by the operator. (UOSHA 1910.213(h) (4)

___ ___ ___ 15. On a radial saw, the direction of saw rotation shall be conspicuously marked on the hood. (UOSHA 1910.213(h) (5)

___ ___ ___ 16. The knife projection on a jointer shall not exceed 1/8" beyond the cylindrical body of the head. (UOSHA 1910.213 (j) (1)

___ ___ ___ 17. On a jointer, the clearance between the edge of the rear table and the cutter head shall be no more than 1/8", and the table throat opening shall not be more than 1 1/2" when the tables are set or aligned for a zero cut. (UOSHA 1910. 213(j) (2)

___ ___ ___ 18. Each jointer with a horizontal cutting head shall have an automatic guard which will cover all sections of the head on the working side of the fence or gage. (UOSHA 1910. 213(j) (3)

___ ___ ___ 19. Each jointer must have a guard which will cover the section of the head in back of the gage or fence. (UOSHA 1910.213 (j) (4)

___ ___ ___ 20. On a wood shaper, the cutting heads of each machine shall be enclosed with a cage or adjustable guard so designed as to keep the operator's hand away from the cutting edge. (UOSHA 1910.213(m) (1)

___ ___ ___ 21. Each planing machine shall have all cutting heads covered by a metal guard. (UOSHA 1910.213(n) (1)

___ ___ ___ 22. On a planer, all feed rolls shall be guarded by a hood to prevent hands of the operator from coming in contact with the inrunning rolls at any point. (UOSHA 1910.213(n) (3)

C NC NA

___ ___ ___ 23. Wood lathes used for turning long pieces of stock held only between the two centers shall be equipped with long curved guards extending over the tops of the lathes. (UOSHA 1910.213(o) (4)

___ ___ ___ 24. Each drum sanding machine shall have an exhaust hood or other guard, if no exhaust system is required over the drum. (UOSHA 1910.213(p) (2)

___ ___ ___ 25. Disk sanding machines shall have an exhaust hood or other guard. (UOSHA 1910.213(p) (3)

___ ___ ___ 26. Belt sanding machines shall be provided with guards at each nip point where the sanding belt runs on to the pulley. (UOSHA 1910.213(p) (4)

___ ___ ___ 27. Woodworking machinery with blades that are dull, badly set, improperly filed, or improperly tensioned shall be immediately removed from service. (UOSHA 1910.213(s) (1)

___ ___ ___ 28. Appropriate push sticks or blocks, in several sizes and types for the work to be done, shall be available at the workplaces on all woodworking machines. (UOSHA 1910.213(s) (9)

C NC NA

___ ___ ___ 29. All portable circular saws shall be equipped with guards above and below the base plate or shoe, and when the tool is withdrawn from the work, the lower guards shall automatically and instantly return to covering position. (UOSHA 1910.243(a) (1)

___ ___ ___ 30. Portable belt sanding machines shall be provided with guards at each nip point where the sanding belt runs on to the pulley. (UOSHA 1910.243(a) (3)

U. Welding Area

___ ___ ___ 1. Oxygen manifolds shall not be located in an acetylene generator room. (UOSHA 1910.252(v) (3) (ii) (b)

___ ___ ___ 2. An oxygen manifold to which cylinders having an aggregate capacity of more than 6,000 cubic feet of oxygen are connected, shall be located outdoors. (UOSHA 1910.252(v) (3) (ii) (d)

___ ___ ___ 3. Master shut-off valves for both oxygen and fuel gas shall be provided at the entry end of the portable outlet header. (UOSHA 1910.252(a) (3) (iv) (d)

___ ___ ___ 4. When acetylene cylinders are coupled, approved flash arresters shall be installed between each cylinder and the coupler block. (UOSHA 1910.252(a) (3) (v) (d)

___ ___ ___ 5. Each fuel gas cylinder head shall be provided with a back flow check valve. (UOSHA 1910.252(a) (3) (v) (e)

___ ___ ___ 6. Protective equipment shall be installed in the fuel gas piping to prevent backflow of oxygen into the fuel gas supply system; passage of the flashback into the fuel gas supply system; and excessive back pressure of oxygen in the fuel gas supply system. (UOSHA 1910.252(a) (5) (iii) (b)

___ ___ ___ 7. Stations equipped with approved backflow and flashback devices may have as many as four torches supplied from one station outlet, with each outlet supplied with a shut-off valve. (UOSHA 1910.252(a) (5) (iv) (h)

___ ___ ___ 8. The generally recognized colors for welding hoses are: red for acetylene, green for oxygen hose and black for inert gas and air hose. (UOSHA 1910.252(a) (5) (v) (b)

___ ___ ___ 9. When parallel lengths of oxygen and acetylene hoses are taped together, not more than four inches out of twelve inches shall be covered by tape. (UOSHA 1910.252(a) (5) (v) (c)

C NC NA

___ ___ ___ 10. Acetylene generators shall be of approved construction and shall be plainly marked with the maximum rate of acetylene in cubic feet per hour for which they are designed, and the weight and size of carbide necessary for a single charge. (UOSHA 1910.252(a) (6) (i)

___ ___ ___ 11. Relief valves on acetylene generators shall be regularly operated to insure proper functioning and must not be set in excess of 15 p.s.i. (UOSHA 1910.252(a) (6) (ii) (b)

___ ___ ___ 12. Non-automatic generators shall not be used for generating acetylene at pressures exceeding one p.s.i. and all water overflow shall be visible. (UOSHA 1910.252(a) (6) (ii) (c)

___ ___ ___ 13. The use of common salt or other corrosive chemicals for protection of freezing of generators is not permitted. (UOSHA 1910.252(a) (6) (iv) (2)

___ ___ ___ 14. Portable acetylene generators shall not be used within ten feet of combustible materials other than the floor. (UOSHA 1910.252(d) (5) (v) (a) (1)

___ ___ ___ 15. Portable generators shall not be used in rooms of total volume less than thirty-five times the total gas generating capacity per charge of all generators in the room. (UOSHA 1910.252(a) (6) (v) (a) (3)

___ ___ ___ 16. Generators shall not be used in rooms having a ceiling height of less than ten feet. (UOSHA 1910.252(a) (6) (v) (a) (3)

___ ___ ___ 17. Portable generators shall be cleaned and recharged and the air mixture blown off outside of buildings. (UOSHA 1910. 252(a) (6) (v) (b) (1)

___ ___ ___ 18. The water carbide residue mixture drained from the generator shall not be discharged into sewer pipes. (UOSHA 1910.252(4) (a) (6) (vii) (a) (4)

___ ___ ___ 19. Portable generators shall be located at a safe distance from the welding position so that they will not be exposed to sparks, slag, or misdirection of the torch flame. (UOSHA 1910.252 (a) (6) (v) (b) (5)

___ ___ ___ 20. Calcium carbide shall be contained in metal packages of sufficient strength to prevent rupture. These packages shall be water and air tight and shall be conspicuously marked, CALCIUM CARBIDE - DANGEROUS IF NOT KEPT DRY. (UOSHA 1910.252(a) (6) (v) (7) (i) (a)

C NC NA

___ ___ ___ 21. Only quantities of calcium carbide of less than 600 pounds may be stored indoors. (UOSHA 1910.252(a) (6) (v) (7) (ii)

___ ___ ___ 22. Open circuit voltages for arc welding and cutting machines shall not exceed 80 volts for manual alternating current machines; 100 volts for automatic machines, and 100 volts for manual direct current machines. (UOSHA 1910.252(b) (2) (iii) (a)

___ ___ ___ 23. Terminals for welding leads should be protected from accidental electrical contact by personnel or metal objects. (UOSHA 1910.252(d)

___ ___ ___ 24. All ground connections shall be checked to determine if they are mechanically strong and electrically adequate for the required current. (UOSHA 1910.252(e)

___ ___ ___ 25. A disconnecting switch or controller shall be provided at or near each welding machine. (UOSHA 1910.252(b) (2) (iv) (d)

___ ___ ___ 26. Printed rules and instructions covering the operation of arc welding equipment supplied by the manufacturer shall be strictly followed. (UOSHA 1910.252(b) (4) (vi)

C NC NA

___ ___ ___ 27. Electrode holders, when not in use, shall be placed so that they cannot make electrical contact with persons or compressed gas tanks. (UOSHA 1910.252(b) (4) (vii)

___ ___ ___ 28. Cables with splices within ten feet of the holder shall not be used. (UOSHA 1910.252(b) (4) (viii)

___ ___ ___ 29. Cables from the arc welder should be inspected frequently for wear and damage. (UOSHA 1910.252(4) (ix) (c)

___ ___ ___ 30. Spot and seam welding machines shall have all external welding control circuits less than 120 volts. (UOSHA 1910.252(b) (4) (c) (2) (i)

___ ___ ___ 31. All press welding machine operations, where there is a possibility of the operator's fingers being under the point of operation, shall be guarded by use of a device such as electronic eye circuit or two hand controls. (UOSHA 1910.252(4) (b) (c) (2) (iv)

___ ___ ___ 32. On sopt welders, a shield guard of safety glass or suitable fire-resistant plastic may be necessary at the point of operation. (UOSHA 1910.252(b) (4) (c) (2) (v)

___ ___ ___ 33. All foot switches on spot welders shall be guarded to prevent accidental operation of the machine. (UOSHA 1910.252 (b) (4) (c) (2) (vi)

___ ___ ___ 34. Whenever welding or cutting is performed in locations where a fire might develop, fire watchers shall be required. (UOSHA 1910.252(d) (2) (iii)

___ ___ ___ 35. Fire watchers shall have fire extinguishing equipment readily available and be trained in its use. (UOSHA 1910.252(d) (2) (v)

___ ___ ___ 36. Cutting or welding shall be permitted only in areas that are or have been made fire safe. (UOSHA 1910.252(d) (2) (xv)

___ ___ ___ 37. No welding or cutting shall be performed on containers having flammable materials until they have been absolutely cleaned. (UOSHA 1910.252 (d) (3) (i)

C NC NA

___ ___ ___ 38. Where the welding or cutting torch is not in use, the torch valve shall be closed and the gas supply to the torch positively shut off at some point outside the confined area. (UOSHA 1910.252(d) (4) (ii)

___ ___ ___ 39. Helmets or handshields shall be used during all arc welding or cutting operations. (UOSHA 1910.252(e) (2) (ii) (b)

___ ___ ___ 40. Goggles or other suitable eye protection shall be used during all gas welding or oxygen cutting operations. OUOSHA 1910.252(e) (2) (i) (b)

___ ___ ___ 41. All operators and attendants of resistance welding or resistance brazing equipment shall use transparent face shields or goggles. (UOSHA 1910.252(e) (2) (i) (c)

___ ___ ___ 42. Helmets and handshields shall be made of a material which is an insulator for heat and electricity. (UOSHA 1910.252 (e) (2) (ii) (a)

___ ___ ___ 43. Helmets and hand shields shall be arranged to protect the face, neck, and ears from direct radiant energy, and they shall be provided with filter plates and cover plates designed for easy removal. (UOSHA 1910.252(e) (2) (ii) (b)

C NC NA

___ ___ ___ 44. All filter lenses shall bear some permanent distinctive mark by which the source and shade may be identified readily. (UOSHA 1910.252(e) (2) (ii) (h)

___ ___ ___ 45. Prescribed filters shall be used for particular types of welding. (UOSHA 1910.252(e) (2) (ii) (i)

___ ___ ___ 46. Where the work permits, the welder should be enclosed in an individual booth painted with a finish of low reflectivity such as zinc oxide and lamp black. (UOSHA 1910.252(e) (2) (ii) (j) (iii)

___ ___ ___ 47. All arc welding electrode-holders must be adequately insulated on all their outer surfaces. (UOSHA 1926.351 (a) (2)

___ ___ ___ 48. Employes exposed to the hazards created by welding, cutting or brazing operations shall be protected by personal protective equipment. (UOSHA 1910.252(e) (3) (i)

___ ___ ___ 49. Welding exhaust ventilation shall consist of freely moving hoods intended to be placed by the welder or burner as close as practicable to the work. (UOSHA 1926.353 (a) (3)

___ ___ ___ 50. All people, including the operator, in the area of inert gas arc metal welding, not protected by screening shall be protected by filter lenses. (UOSHA 1926.353(d) (1) (ii)

___ ___ ___ 51. Welders and other employes who are exposed to the radiation shall be protected so that the skin is covered completely to prevent burns. (UOSHA 1926.353(d) (1) (iii)

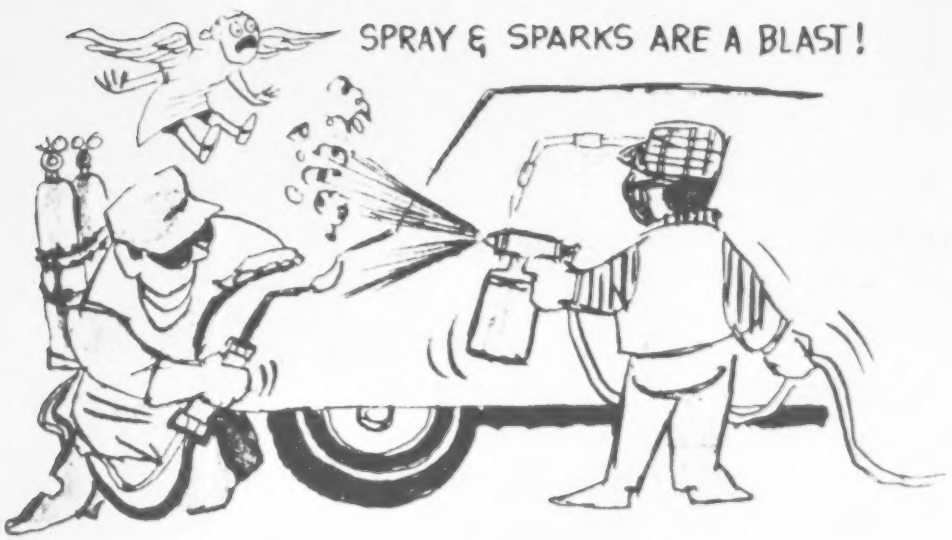
___ ___ ___ 52. For welding operations, mechanical ventilation shall be provided in a space of less than 10,000 cubic feet per welder, or in a room having a ceiling height of less than 16 feet. (UOSHA 1910.252(f) (2) (i)

___ ___ ___ 53. Degreasing or other cleaning operations involving chlorinated hydrocarbons shall be so located that no vapors from these operations will reach or be drawn into the atmosphere surrounding any welding operation. (UOSHA 1910.252(f) (11) (ii)

W. Spray Finishing Operations

___ ___ ___ 1. Spray booths or spray rooms are to be used to enclose or confine all spraying operations. (UOSHA 1910.94(c) (2)

___ ___ ___ 2. Spraying shall not be conducted outside of predetermined spraying areas. (UOSHA 1910.107(g) (1)



C NC NA

___ 3. There shall be no open flame or spark producing equipment in any spraying area nor within 20 feet thereof, unless separated by a partition. (UOSHA 1910.107(c) (2)

___ 4. Electrical wiring and equipment in spray booths shall conform to the provisions of the National Electrical Code. (UOSHA 1910.107(c) (2)

___ 5. Electric lamps outside of, but within twenty (20) feet of any spraying area, and not separated therefrom by a partition shall be totally enclosed to prevent the falling of hot particles and shall be protected from mechanical injury by suitable guards or by location. (UOSHA 1910. 107(c) (7)

___ 6. Spray booths shall be substantially constructed of steel not thinner than No. 18 U.S. gauge, securely and rigidly supported, or of concrete or masonry, except that aluminum or other substantial noncombustible material may be used for intermittent or low volume spraying. Spray booths shall be designed to sweep air currents toward the exhaust outlet. (UOSHA 1910.107(b) (1)

___ 7. Electric motors driving exhaust fans shall not be placed inside booths or ducts. (UOSHA 1910.107(d) (5)

C NC NA

___ ___ ___ 8. Ventilating and exhaust systems shall be in accordance with the Standard for Blower and Exhaust Systems for Vapor Removal, NFPA No. 91-1961. (UOSHA 1910.107(d) (1)

___ ___ ___ 9. All spraying areas shall be provided with mechanical ventilation adequate to remove flammable vapors and mists. (UOSHA 1910.107(d) (2)

___ ___ ___ 10. Mechanical ventilation shall be kept in operation at all times while spraying operations are being conducted and for a sufficient time thereafter to allow vapors from drying coated articles and drying finishing material residue to be exhausted. (UOSHA 1910.107(d) (2)

___ ___ ___ 11. The use of electrostatic spraying equipment must conform to the standards set up in UOSHA 1910.107(h)

___ ___ ___ 12. "NO SMOKING" signs on contrasting color backgrounds shall be conspicuously posted at all spraying areas and paint storage rooms. (UOSHA 1910.107(g) (7)

X. Miscellaneous

___ ___ ___ 1. All equipment and materials used in concrete construction and masonry work shall meet the requirements as prescribed in ANSI - A10.9. (UOSHA 1926.700(a)

___ ___ ___ 2. Scaffolds shall be furnished and erected in accordance with the basic standards for all persons engaged in work that cannot be done safely from the ground except for short periods of work that can be done from ladders. (UOSHA 1910.41(3) (4)

___ ___ ___ 3. Hardening and tempering tanks should be located as far as practicable from the furnace and should not be located near other combustible materials. Tanks must be so designed that maximum workload is incapable of raising the temperature of the cooling medium to within 50° below its flash point. (UOSHA 1910.108(1) (i) (iii)

___ ___ ___ 4. All cleaning operations involving immersion of materials in liquids shall be done in a tank designed for this purpose and with proper ventilation. (OSHA 1910.94(d)

___ ___ ___ 5. All ladders must be maintained to insure safety and service-ability, and safety precautions must be observed in connection with the use of ladders. (UOSHA 1910.25(d) (1) (i)

Health Hazards

There is no doubt that the foregoing Utah checklist provides an excellent self-inspection guide, especially with respect to physical hazards: those related to the possibility of inflicting wounds, or trauma. It will also be noted that some attention is accorded health hazards; however there has recently been a decided upsurge in health hazard emphasis. While health hazards were recognized and known long before their safety counterparts - in fact, their knowledge goes back to ancient times - little was done about them until comparatively recently, with the actual impetus stemming from incidents, such as controversies, noise, for example, and exposures to toxic chemicals, which have received wide publicity. The resultant generalized awareness of the health hazard problem has in turn incurred some surprising revelations. One of these is the fact that carcinogens - cancer producing substances - are much more prevalent in occupational pursuits than was formerly supposed. The explosion of activity that followed the exposure of the toxicity of asbestos led to the identification of 14 carcinogens by the National Institute for Occupational Safety and Health (NIOSH) and the almost simultaneous discovery by both NIOSH and the Bureau of Occupational Health in the Pennsylvania Department of Environmental Resources that these chemicals were commonly used in high school and college laboratories. The Bureau immediately issued a warning concerning the carcinogenic character of the 14 chemicals to all schools and advised their immediate discontinuance:

4-Nitrobiphenyl	Ethyleneimine
alpha-Naphthylamine	beta-Propiolactone
beta-Naphthylamine	2-Acetylaminoflorene
Methyl chloromethyl ether	4-Dimethylaminoazobenzene
3, 3' Dichlorobenzidine	N-Nitrosodimethylamine
Benzidine	Vinyl Chloride
4-Aminodiphenyl	bis [Chloromethyl]

Meantime, NIOSH intensified its efforts to unearth the cancer-producing substances, and has now identified some 8,000 possible carcinogens. Needless to say, this disturbing piece of information not only increases the potential of occupations - particularly certain ones - as sources of cancer, but adds to the concerns of educators at all levels. The same goes for other health hazards.

Briefly stated, there are three sources of health hazards as categorized by agents: physical agents, biological agents, and chemical agents.

The physical agents include noise, which has received wide national attention; vibration, often associated with noise, together with motion and shock; temperature and humidity extremes, electromagnetic radiation, and abnormal air pressure. Excessive noise is a common hazard found in certain school operations - as well as in places of employment - and must be recognized and dealt with by instructors and work study coordinators at training stations. The same goes for all health hazards. The OSHA and Pennsylvania standards for permissible noise levels are identical:

Duration per day, hours	Sound Level dBA (decibels) slow response
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or less	115

As is the case with most health hazards, noise can be measured, but must be measured with instruments. Assistance in this respect is available from both the Bureau of Occupational Health, Department of Environmental Resources, Harrisburg, PA, or from NIOSH through a request for environmental survey.

Among the biological agents are, of course, the disease producing organisims: bacteria, viruses, fungi, parasites. These are cause for special concern, particularly in the agricultural occupations and vocational agriculture programs. However, they present dangers of infection almost universally in the event of ordinary scratches, cuts, and superficial type wounds it left untreated.

The chemical agents are usually airborne and consist of dusts, gases, vapors, fumes, and mists. These find their way into the human body via three routes: breathing (inhalation), absorption (skin contact), and swallowing (ingestion). All airborne matter can be inhaled, which makes this means of access to the body highly suspect and priority prevention and inspection need. The others are dangerous and need attention too. Skin contact is a leading cause of the dermatoses, while toxic substances can easily be ingested by persons eating/lunches with contaminated hands.

Airborne hazards, of course, indicate the critical importance of proper ventilation, and this need extends across all educational and other work environments. So does proper and adequate lighting, and a number of other factors. Each occupational environment, whether its principal activity is teaching or actual performance of the tasks themselves, has its indigenous problems, among them health hazards. By way of an example, there is the radiation hazard in connection with certain of the health occupations. There are many others: handling and use of leads in plumbing, silica in building trades and foundries, compressed gases in welding, to mention a few. Each instructor needs to know, assess, and guard against those relevant to his or her discipline; the administrator needs to plan and implement controls to prevent exposures, and the work study coordinator needs to know the composite of all to perform intelligently in a variety of occupational environments.

Air contaminants are listed by OSHA standard 1910.1000 [formerly 1910.93], which deals with controls of toxic and hazardous materials. Allowable exposures are cited in tables according to acceptable ceiling concentrations or time weighted averages [maximum allowable exposure over an eight-hour period].

Standards for asbestos and the 14 recently referred to carcinogens are similar in many respects. Among the more or less common control requirements are pre- or initial employment physical examinations, regular medical surveillance during employment, training and education, personal protection equipment (respitators, etc.), change rooms, mandatory showering and other work practices, environmental monitoring, posting of appropriate signs and labels, and the like. As additional standards dealing with carcinogens are developed and implemented, they will probably follow similar control patterns.

All this serves to reinforce what has already been said concerning the need for recognizing, assessing, and dealing with health hazards by all educators. No cooperative education coordinator would want to be guilty of sending a student into a contaminated training station to insure the contracting of an occupational disease or the infliction of trauma. The same applies to administrators and teachers in the school environment.

V. HAZARD AND STANDARD IDENTIFICATION

During the treatment of safety and health programming in chapter III, the importance of ascertaining the hazards existent in a work environment was among items emphasized, as was the importance of pertinent OSHA standards as one means of hazard identification. A number of sources have presented standards relevant to various work activities in a variety of contexts. Best,[1] however, has compiled one of the most informative, as well as practical and succinct, treatments of this subject. Another source which has proven most informative and relevant consists of assignments in safety and health facets performed by vocational education students of the Pennsylvania State University in conjunction with studying those aspects of occupational education.

Recently revised, Best's treatment is generally aimed primarily at assisting insurance representatives inspect various establishments to determine their condition for insurance purposes. Among items covered are (1) a description of the products made, or services performed, types of processes and work done, kind of environment and operation(s); (2) materials and equipment involved; (3) exposures and controls, highlighting inspection guidelines from the standpoints of (a) automobile liability, (b) general liability, (c) product liability and completed operations, (d) workmens compensation, (e) fire and e.c. (exposure and controls), (f) business interruptions, (g) inland marine, (h) crime; and (4) references [this item usually consists of relevant OSHA standards]. Authorities generally agree that there are some so-called "universal" standards, or standards that apply to virtually all occupational classifications. Best[2] cites these specifically, using the general industry (1910 series) standards:

1910.22	General Requirements for Walking/Working Surfaces
1910.23	Guarding Floor & Wall Openings and Holes
1910.24	Fixed Industrial Stairs
1910.36	General Requirements for Exits
1910.37	Means of Egress, General
1910.141	Sanitation
1910.144	Safety Color Code for Marking Physical Hazards
1910.145	Specifications for Accident Prevention Signs & Tags
1910.151	Medical Services & First Aid
1910.157	Portable Fire Extinguishers
1910.158	Standpipe & Hose Systems

---

1. A. M. Best, *Best's Loss Control and Engineering Manual* [formerly *Best's Loss Control and Underwriting Manual*].

2. A. M. Best, *Best's Loss Control and Engineering Manual.*

1910.159 Automatic Sprinkler Systems
1910.163 Local Fire Alarm Signaling System
1910.309 National Electrical Code

In its more recent and revised descriptions of respective occupational classifications, Best also cites the OSHA standards pertinent to them in addition to the above listed standards applicable universally. For example, in treating inside building maintenance, Best cites the ensuing standards as applicable to that function:[1]

1910.25 Portable Wood Ladders
1910.26 Portable Metal Ladders
1910.28 Safety Requirements for Scaffolding
1910.29 Manually Propelled Mobile Ladder Stands and Scaffolds (Towers)
1910.106 Flammable and Combustible Liquids
1910.132 General Requirements (Personal Protective Equipment)
1910.133 Eye and Face Protection
1910.134 Respiratory Protection
1910.212 General Requirements for All Machines
1910.242 Hand & Portable Powered Tools and Equipment - General
1910.1000 Air Contaminants

The publication referred to above is not the sole relevant source by this and other publishers. These may be found in the Bibliography to this compilation.

On the succeeding pages are OSHA standards pertinent to occupations commonly taught in vocational technical education programs, including their pursuit through cooperative education and similar endeavors. Most were prepared by Pennsylvania State University Vocational Education undergraduate and graduate students as part of assigned course projects. The standards listed are a composite of the actual work environment - usually a school shop, laboratory, worksite, etc. - as determined from analysis of a prepared layout and that of tasks performed in the environment. All are in addition to the previously described universally applicable standards; these should be added to all the standards listed as applicable to respective occupations.

It is not possible to include all the projects in their entirety; feasibility requires they be limited to listings of appropriate standards. As an example, however, one project is contained in its entirety. It will serve to illustrate the procedures recommended for safety and health programming as described in chapter III. The project follows below.

---

1. A. M. Best, *Best's Loss Control and Engineering Manual.*

Food Services[1]

Section I. Standards and Hazards Identification

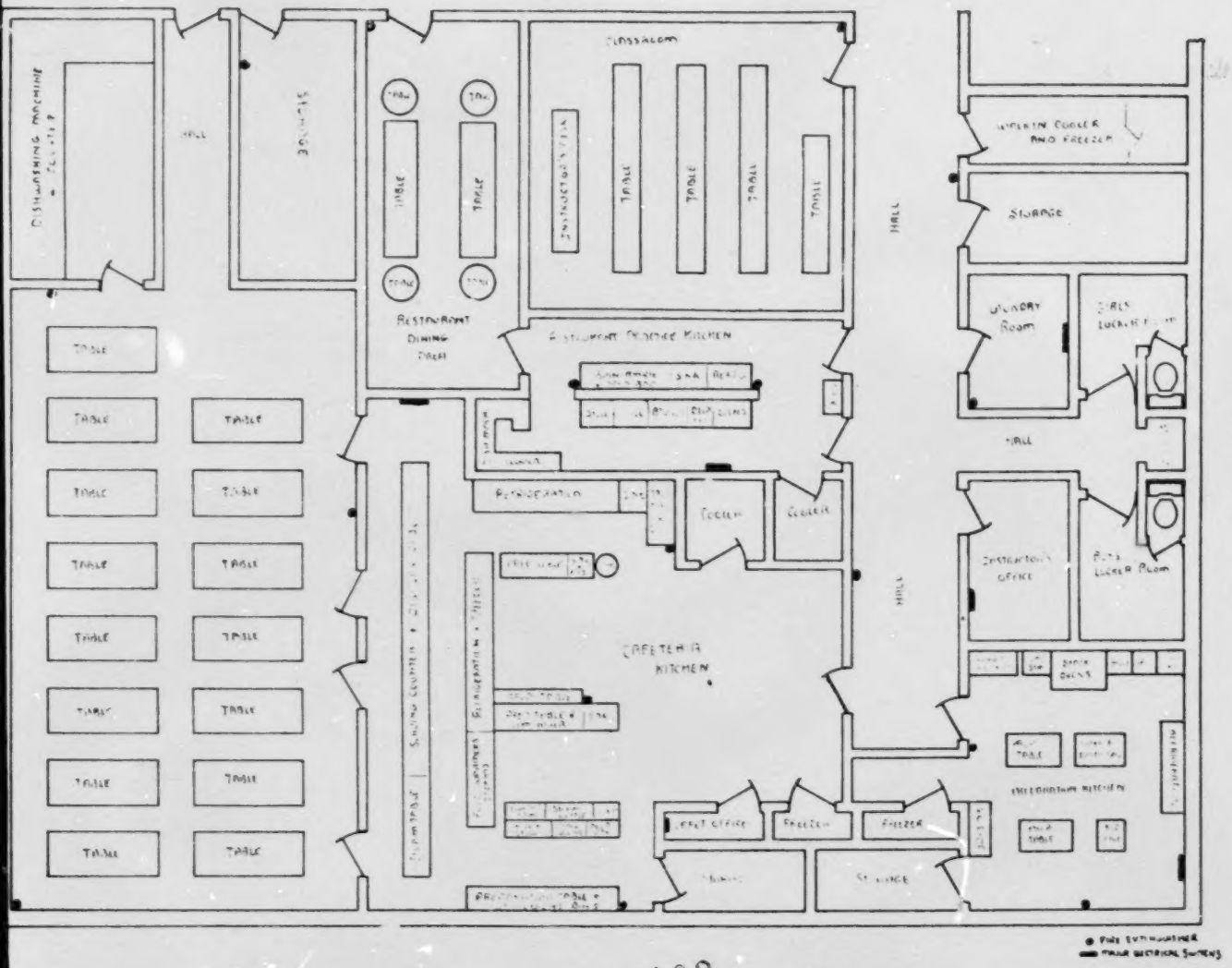
Part A. Survey and Analysis of Environment

In this report one will find a detailed drawing of a Vocational Food Service Shop [next page]. Parts of this shop are identical to the type of environment students will experience when entering careers in the Food Service Industry [*sic*]. Understanding the possible hazards in this environment will help in identifying hazards in industrial settings. The shop drawing includes the following:

a. cafeteria kitchen, storage, and dishroom;
b. cafeteria dining area and office;
c. restaurant kitchen, storage, and dining area;
d. preparation kitchen and storage;
e. instructors office and classroom;
f. locker rooms (boys and girls);
g. laundry room; and
h. general food storage rooms.

---

1. Robert W. Biddle.



● FIRE EXTINGUISHER
▬ TRUE METRICAL SYSTEMS

SCALE 1/4"=1'-0" 4-28-76
DRAWN BY R. RAHMER

Food Services Environmental Composition

General Food Supplies

- Bakery Products
- Canned Goods and Staples
- Dairy Products and Eggs
- Fresh Fruits and Vegetables
- Frozen Fruits and Vegetables
- Fish, Shellfish, and Fish Products
- Meat and Meat Products
- Poultry and Poultry Products
- Miscellaneous Food Supplies

Equipment

Hand Tools:

- Cutting Implements
- Food Handling Implements
- Stirring, Serving, Scraping, Spreading Implements
- Food Preparation Implements
- Cooking Utensils
- Baking Implements
- Measuring Implements

Stationary/Power Equipment:

- Scales
- Deep Fat Fryers
- Mixing Machines and Attachments
- Vertical Cutter Mixer (VCM)
- Stoves, Grills, Ovens, Broilers
- Slicers and Grinders
- Refrigerated Equipment
- Freezer Equipment
- Sinks and Disposal Units
- Steam Equipment
- Coffee Urns
- Soda Dispensers
- Dishwashers
- Ice Machines
- Dough Dividers and Sheeters
- Tables and Chairs
- Portable Waitress Stations
- Cash Registers
- Can Openers
- Heat Lamps
- Food Racks
- Desks
- Washing Machines and Dryers

Foods Prepared

- Appetizers
- Sandwiches
- Salads and Dressings
- Quickbreads (Batters and Doughs)
- Yeast Breads and Products
- Cookies
- Pie Doughs, Fillings, and Toppings
- Cakes and Frostings
- Meats (Beef, Veal, Lamb, Pork)
- Poultry and Game Birds
- Fish and Shellfish
- Soups and Stocks
- Sauces and Gravies
- Fruits and Vegetables
- Eggs

Part B. Occupational Safety and Health Administration June 27, 1974
[Applicable] Occupational Safety and Health Standards - Food Trades

Subpart D (Walking and Working Surfaces)

1910.22 General requirements
1910.23 Guarding floor and wall openings and holes
1910.24 Fixed industrial stairs
1910.25 Portable wood ladders
1910.26 Portable metal ladders
1910.27 Fixed ladders

Subpart E (Means of Egress)

1910.36 General requirements
1910.37 Means of egress, general

Subpart G (Occupational Health and Environmental Control)

1910.93 Air contamitants
1910.94 Ventilation
1910.95 Occupational noise exposure
1910.97 Nonionizing radiation

Subpart H (Hazardous Materials)

1910.106 Flammable and combustible liquids

Subpart I (Personal Protective Equipment)

1910.132 General requirements
1910.136 Foot protector

Subpart J (General Environmental Controls)

1910.141 Sanitation
1910.144 Safety color code for marking physical hazards
1910.145 Specifications for accident prevention signs and tags

Subpart K (Medical and First Aid)

1910.151 Medical services and first aid

Subpart L (Fire Protection)

1910.157 Portable fire extinguishers
1910.158 Standpipe and hose systems
1910.159 Automatic sprinkler systems
1910.160 Fixed dry chemical extinguishing systems
1910.161 Carbon dioxide extinguishing systems
1910.162 Other special fixed extinguishing systems
1910.163 Local fire alarm signaling systems

Subpart N (Materials Handling and Storage)

1910.176 Handling materials, general
1910.177 Indoor general storage

Subpart O (Machinery and Machine Guarding)

1910.212 General requirements for all machines
1910.215 Abrasive wheel machinery

Subpart P (Hand and Portable Powered Tools and Other Hand Held Equipment)

1910.242 Hand and portable powered tools and equipment general
1910.243 Guarding of portable powered tools
1910.244 Other portable power tools and equipment

Subpart R (Special Industries)

1910.263 Bakery equipment
1910.264 Laundry machinery and operations

Subpart S (Electrical)

1910.309 National electrical code

Section 5 of the *Occupational Safety and Health Act*,[1] popularly known as the "General Duty Clause," applies to all conditions not covered by standards and to employe work practices:

> 5 (a) Each employer shall
>
> (1) furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;
>
> (2) comply with occupational safety and health standards promulgated under this Act.
>
> (b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.

---

1. *Occupational Safety and Health Act of 1970*, p. 4.

Environmental Relationship to Standards

Subpart D - Walking and Working Surfaces

Standard	Relationship	Hazards
1910.22 General Requirements	This standard would apply to all walking and working surfaces leading in and out of the various food departments. Example: cafeteria, restaurant, and preparation kitchen. This also includes areas where water processes are performed, such as dishrooms, where proper drainage systems are needed. Surfaces where a nonskid surface should be used, such as in front of ovens, broilers, and grills, could also be found under this standard.	1) Disorderly passageways, storerooms, and service areas kept in an unsanitary manner. 2) Improper drainage in dishrooms, causing floors to become wet and slippery. 3) Improper platforms, mats, and floor coverings in front of ovens, broilers, or wherever practical.
1910.23 Guarding Floor and Wall Openings and Holes	This standard applies to all floor and wall openings leading to basement or other parts of the environment. Floor openings, such as dumbwaiters, for the transportation of food between floors, or regular doors and windows in the environment, are classified as wall openings.	1) Improperly marked floor and wall openings in and out of environment departments. 2) Broken or cracked glass in doors and windows. 3) Insufficient amount of doors for smooth running food service operation.
1910.24 Fixed Industrial Stairs	This standard applies to all stairs leading from all parts of the food operation. Example: stairs leading to basement, or stairs at loading and receiving docks.	1) Improperly marked stairways causing confusion. 2) Improperly guarded stairways which do not contain acceptable railing for safe walking surfaces.

Standard	Relationship	Hazards
1910.25 Portable Wood Ladders 1910.26 Portable Metal Ladders 1910.27 Fixed Ladders	Ladders are used in the food service environment mainly as an aid in storerooms. Ladders in this environment vary in type, depending on their intended use.	1) Broken rungs on ladders, which cause falls and slipping. 2) Painted ladders. 3) Ladders made of nonacceptable wood. 4) Improper support for ladders and excess amount of weight. 5) Ladders which have sharp edges, splinters, or other irregularities.
Subpart E - Means of Egress		
1910.36 General Requirements 1910.37 Means of Egress, General	This includes means of exit and entrance into the food service environment; outside and inside passageways leading to an escape of the environment in case of an emergency.	1) Improperly marked exits which cause great confusion. 2) Unsanitary obstructions that block exits with litter and prevent an efficient operation.
Subpart G - Occupational Health and Environmental Control		
1910.94 Ventilation	Ventilation systems are used above all ovens, grills, broilers, and steam operated equipment.	1) Uncleaned screens in ventilation systems causing toxic smells to remain in environment rather than escape (smoke, ammonia, etc.).
1910.95 Occupational Noise Exposure	Occupational noise exposure could come from stationary equipment in the food service environment.	1) Defective stationary equipment.
1910.97 Nonionizing Radiation	Operation of microwave oven.	1) Exposure to microwave radiation.

Standard	Relationship	Hazards
Subpart H - Hazardous Materials		
1910.101 Compressed Gases, General Requirements	Gas operated ovens, broilers, and grills which are utilized in the food service environment.	1) Leaking gas lines leading to equipment. 2) Improper connections to tank or equipment.
1910.106 Flammable and Combustible Liquids	Grease in deep fat fryers; cleaning solvents that are combustible.	1) Improper grease for type of deep fat fryers. 2) Improper amount of grease in fryer. 3) Unguarded or improperly stored cleaning solvents.
Subpart I - Personal Protective Equipment		
1910.132 General Requirements	Protective clothing, such as chef coats with long sleeves, to protect against burns.	1) Improper protective clothing.
1910.135 Occupational Head Protection	Protective head cover and hair restraints both for fire prevention and sanitation.	1) Danger of fire and hair falling into foods under preparation.
1910.136 Occupational Foot Protection	Foot protection, such as hard shoes.	1) Improper footwear (such as soft shoes).

Standard	Relationship	Hazards
Subpart J - General Environmental Controls		
1910.141 Sanitation	Properly cleaned restrooms and general food service area.	1) Overfilled waste containers. 2) Unsanitary lavatory, storerooms, and service areas. 3) Improper disposal of trash and waste materials. 4) Entrance available for rodents, insects (unscreened doors and windows). 5) Improper water supply and drainage system. 6) Unsanitary employe practices. 7) Uncleaned hand tools and stationary equipment.
1910.144 Safety Color Code for Marking Physical Hazards	1) Dishwashing areas for slippery floors. 2) Hot areas around ovens, broilers.	1) Unmarked areas. 2) Improper instruction in color coding.
1910.145 Specifications for Accident Prevention Signs and Tags	1) Mark defective stationary equipment. 2) Mark dangerous areas.	1) Unmarked defective machinery. 2) Unmarked areas that are dangerous.

Standard	Relationship	Hazards
Subpart K. - Medical and First Aid		
1910.151 Medical Services and First Aid	Satisfactory first aid kit and emergency alarms are needed. Sufficient employes must be qualified and certified in first aid.	1) Inaccessible emergency alarm. 2) Inaccessible master switch for shop operation. 3) Improper first aid supplies. 4) Unauthorized first aider on the job site. 5) Hospital not at reasonable distance from environment.
Subpart L - Fire Protection		
1910.157 Portable Fire Extinguishers 1910.158 Standpipe and Hose Systems 1910.159 Automatic Sprinkler Systems 1910.160 Fixed Dry Chemical Extinguishing Systems 1910.161 Carbon Dioxide Extinguisher 1910.162 Other Special Fixed Extinguisher Systems 1910.163 Local Fire Alarm Signaling Systems	Fire extinguishers are used for all types of fires, including paper, grease, and electrical fires.	1) Improper types of extinguishers. 2) Defective fire extinguisher. 3) Defective fire alarms.

Standard	Relationship	Hazards
Subpart N - Materials Handling and Storage		
1910.176 Handling Materials, General 1910.177 Indoor General Storage	Storerooms in food trades, because of great turnover of supplies.	1) Insufficient amount of storage space. 2) Defective storage shelves. 3) Defective ladders.
Subpart O - Machinery and Machine Guarding		
1910.212 General Requirements for all Machines	Stationary equipment, ovens, broilers, etc.	1) Defective machine parts. 2) Improper electrical connection. 3) Uncleaned equipment.
1910.215 Abrasive Wheel Machinery	Electric slicers.	1) Defective machine parts.
Subpart P - Hand and Portable Powered Tools and Other Hand Held Equipment		
1910.242 Hand and Portable Powered Tools and Equipment, General	Electrical knives. Electrical mixers.	1) Defective wiring. 2) Defective parts on tool. 3) Inaccessible switches.
1910.243 Guarding of Portable Power Tools 1910.244 Other Portable Power Tools and Equipment	Electric slicers or knives.	1) Defective guards. 2) Inaccessible switches.
Subpart R - Special Industries		
1910.263 Baking Equipment	Dough divider. Dough sheeter.	1) Defective guards. 2) Defective machinery. 3) Inaccessible switches. 4) Improper electrical connection (cords and plugs).

Standard	Relationship	Hazards
1910.264 Laundry Machinery and Operations	Washing of uniforms and towels.	1) Defective machinery. 2) Defective drainage system. 3) Improper water supply.
Subpart S - Electrical		
1910.309 National Electric Code	Electric equipment.	1) Improper wiring. 2) Worn electrical cords.
Subpart T - Toxic and Hazardous Substances		
1910.1000 Air Contaminants	Air contaminants in the food service trade include contaminants from cleaning, such as ammonia, gas from leaking gas lines, or improper heating systems.	1) Improper storage of contaminants or through use of such contaminants as ammonia. 2) Leaking gas lines or equipment. 3) Defective heating systems.

Standard	Relationship	Hazards
Subpart N - Materials Handling and Storage		
1910.176 Handling Materials, General 1910.177 Indoor General Storage	Storerooms in food trades, because of great turnover of supplies.	1) Insufficient amount of storage space. 2) Defective storage shelves. 3) Defective ladders.
Subpart O - Machinery and Machine Guarding		
1910.212 General Requirements for all Machines	Stationary equipment, ovens, boilers, etc.	1) Defective machine parts. 2) Improper electrical connection. 3) Uncleaned equipment.
1910.215 Abrasive Wheel Machinery	Electric slicers.	1) Defective machine parts.
Subpart P - Hand and Portable Powered Tools and Other Hand Held Equipment		
1910.242 Hand and Portable Powered Tools and Equipment, General	Electrical knives. Electrical mixers.	1) Defective wiring. 2) Defective parts on tool. 3) Inaccessible switches.
1910.243 Guarding of Portable Power Tools 1910.244 Other Portable Power Tools and Equipment	Electric slicers or knives.	1) Defective guards. 2) Inaccessible switches.
Subpart R - Special Industries		
1910.263 Baking Equipment	Dough divider. Dough sheeter.	1) Defective guards. 2) Defective machinery. 3) Inaccessible switches. 4) Improper electrical connection (cords and plugs).

Standard	Relationship	Hazards
1910.264 Laundry Machinery and Operations	Washing of uniforms and towels.	1) Defective machinery. 2) Defective drainage system. 3) Improper water supply.
Subpart S - Electrical		
1910.309 National Electric Code	Electric equipment.	1) Improper wiring. 2) Worn electrical cords.
Subpart T - Toxic and Hazardous Substances		
1910.1000 Air Contaminants	Air contaminants in the food service trade include contaminants from cleaning, such as ammonia, gas from leaking gas lines, or improper heating systems.	1) Improper storage of contaminants or through use of such contaminants as ammonia. 2) Leaking gas lines or equipment. 3) Defective heating systems.

Jobs Performed	Hazards	Standards
q) Portable waitress stations r) Cash registers s) Heat lamps t) Food racks u) Desks v) Washing machines and dryers		
5) Serving foods which have been prepared: a) Appetizers b) Sandwiches c) Salads and dressings d) Quickbreads (batters and doughs) e) Yeast breads and products f) Cookies g) Pie doughs, fillings and toppings h) Cakes and frosting i) Meats (beef, veal, lamb, pork) j) Poultry and game birds k) Fish and shellfish l) Soups and stocks m) Sauces and gravies n) Fruits and vegetables o) Eggs p) Beverages	1) Loose or defective flooring tiles, boards, etc.) 2) Blocked aisles and passageways 3) Unmarked exits 4) Inadequate railing or stairways and walking surfaces 5) Inadequate lighting 6) Defective serving equipment 7) Inadequate drainage systems 8) Insufficient space for serving area 9) Improper clothing 10) Broken glassware, dishes and silverware 11) Improper fire protection	1910.22 1910.36-37 1910.36-37 1910.24 5a 1910.244 1910.22 5a 1910.132 5a 1910.157-1910.163

[Note: Although several of the foregoing hazards refer to work practices or human factors, there are many more. One example is an employe functioning in various jobs while ill with a communicable disease.]

Section III. Job Hazard Analysis

Job: Preparing French Fries

Tasks	Hazards	Corrections	Standards
1) Lift and carry a 50 lb. sack of potatoes to preparation area	1) Unmarked passageways 2) Blocked aisles 3) Improper lifting methods 4) Insufficient amount of storage space	1) Clean all passageways as sanitary as possible 2) Lift supplies properly 3) Mark all doors 4) Enough storage space should be supplied	1910.22 1910.176 1910.177 5a 1910.36-37
2) Wash and clean potatoes in sink	1) Inadequate personal hygiene 2) Inadequate drainage systems 3) Inadequate water supply	1) Wash hands properly 2) Check water supply 3) Be careful when using garbage disposal units 4) Have sufficient lighting	1910.141 1910.22 5a
3) Remove outside skin by hand or with electric potato peeler	1) Defective hand tool (dull blades) 2) Defective stationary equipment 3) Worn electrical cords 4) Inaccessible switches 5) Improperly grounded machinery 6) Inadequate lighting	1) Check all hand tools and equipment 2) Check for worn cords 3) Check lighting	1910.242 1910.243 1910.244 1910.212 1910.215 1910.309 5a 1910.141
4) Cut potatoes into desired shape, rinse in cold water and drain	1) Defective hand tools (dull knife blades) 2) Inadequate drainage system 3) Inadequate water supply 4) Inadequate lighting	1) Check all hand tools (sharpen blades) 2) Check water supply 3) Check drainage system	1910.242 243 and 244 1910.22 5a 1910.141

Tasks	Hazards	Corrections	Standards
5) Place grease in fryer, preheat fryer to 350°F	1) Improperly grounded electrical units 2) Worn or defective wire and plugs 3) Inaccessible switches 4) Defective equipment 5) Inadequate lighting procedures 6) Improper grease for fryer 7) Improper fire protection 8) Insufficient amount of grease	1) Check all electrical connections 2) Check all equipment 3) Lift correctly 4) Check for proper fire extinguisher 5) Check type of grease and amount needed	1910.106 1910.157 1910.163 1910.309 5a 1910.141
6) Deep fry potatoes until golden brown, then shake off excess grease and place on plate	1) Defective equipment 2) Splashing grease when frying 3) Broken or chipped serving dishes	1) Check that all equipment is working properly 2) Place fry basket in fryer slowly 3) Check all serving equipment for chips and cracks	1910.141 1910.212 (5a)

Section IV. Food Service Checklist

	Acceptable	Nonacceptable	Comments and Correction
1. Are all floors in safe condition: free from broken tiles and floor boards. covered with a nonskid material. cleaned thoroughly daily.			
2. Are all trash containers washed daily, leak proof, properly covered, and adequate in number and size?			
3. Are all shelves and storage spaces strong enough to bear weight of items stored?			
4. Are adequate tools available for opening supplies?			
5. Is equipment provided for reaching high storage and is this equipment safe? (example - ladders)			
6. Are flammable materials stored away from hot areas?			
7. Are proper fire extinguishers installed?			
8. Is there a proper fire alarm?			
9. Is there adequate space provided for the jobs which must be done?			
10. Is there an adequate water supply and drainage system?			
11. Is there an adequate ventilator system?			
12. Is there an adequate lighting system?			
13. Is there an adequate heating system?			
14. Are all machines properly guarded?			

	Acceptable	Nonacceptable	Comments and Corrections
15. Is all electrical equipment properly grounded, free from worn wire and plugs?			
16. Are switches readily accessible?			
17. Are all exits and entrances marked properly?			
18. Are all doors provided with locks that can be opened from the inside?			
19. Are all passageways free from unnecessary obstructions?			
20. Are all stairs supplied with adequate railings and free from other irregularities?			
21. Does all stationary equipment and hand tools run properly?			
22. Are all serving counters, tables and chairs free of broken parts?			
23. Are all employees dressed properly?			
24. Are sanitary procedures followed throughout operation?			
25. Is there an acceptable first aid procedure?			

Baking

Since food services have just been treated, baking should properly be addressed here. In some schools, as well as some commercial operations, baking is incorporated into the food services operation; in others it is a separate occupational specialty [Bakery Equipment is accorded specific treatment as a special industry in Subpart R of the OSHA general industry standards]. However, except for several variations in equipment, and fewer varieties of tasks, bakeries are similar to the above described food services occupation with respect to applicable standards. Bakery environments undoubtedly contain more mixing equipment and perhaps specialized types of ovens (hearth, for example), plus proof boxes and fermentation cabinets. Otherwise, the similarity is so strong that baking will not be accorded further separate treatment.

Standards pertinent to other typical vocational technical programs follow.

Auto Body Repair[1]

1910.94	Ventilation
1910.102	Acetylene
1910.104	Oxygen
1910.106	Flammable and Combustible Materials
1910.107	Spray Finishing Using Flammable or Combustible Materials.
1910.132	General Requirements [Subpart I, Personal Protective Equipment]
1910.133	Eye and Face Protection
1910.134	Respiratory Protection
1910.136	Occupational Foot Protection
1910.137	Electrical Protective Devices
1910.160	Fixed Dry Chemical Extinguishing Systems
1910.176	Handling Materials - General
1910.212	General Requirements for All Machines [machine guarding]
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.251	Definitions [Subpart Q, Welding, Cutting and Brazing]
1910.252	Welding, Cutting and Brazing

Auto Mechanic[2]

1910.94	Ventilation
1910.101	Compressed Gases, General Requirements
1910.106	Flammable and Combustible Liquids
1910.107	Spray Finishing Using Flammable and Combustible Materials
1910.133	Eye and Face Protection
1910.137	Electrical Protective Devices

---

1. Jayson P. Reitz.

2. Robert H. Quiggle and Mike Salisbury.

1910.176	Handling Materials - General
1910.178	Powered Industrial Trucks
1910.212	General Requirements for All Machines [machine guarding]
1910.215	Abrasive Wheel Machinery
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.243	Guarding of Portable Powered Tools
1910.244	Other Portable Tools and Equipment
1910.1000	Air Contaminants
1910.1001	Asbestos [Also note 1910.19: Asbestos Dust]

Diesel Mechanic[1]

1910.94	Ventilation
1910.95	Occupational Noise Exposure
1910.101	Compressed Gases (General Requirements)
1910.102	Acetylene
1910.104	Oxygen
1910.106	Flammable and Combustible Liquids
1910.108	Dip Tanks Containing Flammable or Combustible Liquids
1910.110	Storage and Handling of Liquified Petroleum Gases
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.135	Occupational Head Protection
1910.136	Occupational Foot Protection
1910.176	Handling Materials - General
1910.178	Powered Industrial Trucks
1910.179	Overhead and Gantry Cranes
1910.215	Abrasive Wheel Machinery
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.243	Guarding of Portable Powered Tools
1910.244	Other Portable Tools and Equipment
1910.252	Welding, Cutting and Brazing
1910.1000	Air Contaminants
1910.1003	4-Nitrobiphenyl

Appliance Repair[2, 3]

1910.94	Ventilation
1910.102	Acetylene
1910.104	Oxygen
1910.106	Flammable and Combustible Materials
1910.135	Occupational Head Protection
1910.164	Fire Brigades [Reserved]
1910.166	Inspection of Compressed Gas Cylinders

---

1. Robert Hinger and James Verbeck.

2. Harold E. Cohick.

3. See also *Electricity; Electronics* for additional relevant standards.

1910.167	Safety Relief Devices for Compressed Gas Cylinders
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.252	Welding, Cutting and Brazing
1910.264	Laundry Machinery and Operations

Carpentry[1, 2]

1910.25	Portable Wood Ladders
1910.26	Portable Metal Ladders
1910.27	Fixed Ladders
1910.28	Safety Requirements for Scaffolding
1910.29	Manually Propelled Mobile Ladder Stands and Scaffolds (Towers)
1910.30	Other Working Surfaces
1910.66	Power Platforms for Exterior Building Maintenance
1910.94	Ventilation
1910.95	Occupational Noise Exposure
1910.101	Compressed Gases (General Requirements)
1910.106	Flammable and Combustible Liquids
1910.107	Spray Finishing Using Flammable and Combustible Materials
1910.132	General Requirements [for Personal Protective Equipment]
1910.133	Eye and Face Protection
1910.134	Respiratory Protection
1910.135	Occupational Head Protection
1910.136	Occupational Foot Protection
1910.166	Inspection of Compressed Gas Cylinders
1910.169	Air Receivers
1910.176	Handling Materials - General
1910.178	Powered Industrial Trucks
1910.179	Overhead and Gantry Cranes
1910.212	General Requirements for All Machines [Machine Guarding]
1910.213	Woodworking Machinery Requirements
1910.215	Abrasive Wheel Machinery
1910.218	Forging Machines
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.243	Guarding of Portable Powered Tools
1910.244	Other Portable Tools and Equipment
1910.265	Sawmills
1910.1000	Air Contaminants
1926.3	Inspections - Right of Entry
1926.20	General Safety and Health Provisions
1926.21	Safety Training and Education
1926.22	Recording and Reporting of Injuries
1926.23	First Aid and Medical Attention
1926.24	Fire Protection and Prevention
1926.25	Housekeeping

---

1. Chester DiRomualdo and Ronald Hoyman.

2. The carpentry trade exists in several environments, among them a shop (general industry, 1910 series) and construction (1926 series). Both are given.

1926.26	Illumination
1926.27	Sanitation
1926.28	Personal Protective Equipment
1926.50	Medical Services and First Aid
1926.51	Sanitation
1926.52	Occupational Noise Exposure
1926.55	Gases, Vapors, Fumes, Dusts, and Mists
1926.56	Illumination
1926.57	Ventilation
1926.100	Head Protection
1926.101	Hearing Protection
1926.102	Eye and Face Protection
1926.103	Respiratory Protection
1926.104	Safety Belts, Lifelines, and Lanyards
1926.105	Safety Nets
1926.150	Fire Protection
1926.151	Fire Prevention
1926.152	Flammable and Combustible Liquids
1926.154	Temporary Heating Devices
1926.200	Accident Prevention Signs and Tags
1926.202	Barricades
1926.250	General Requirements for Storage
1926.251	Rigging Equipment for Material Handling
1926.252	Disposal of Waste Materials
1926.300	General Requirements (Tools - Hand and Power)
1926.301	Hand Tools
1926.302	Power Operated Hand Tools
1926.303	Abrasive Wheels and Tools
1926.304	Woodworking Tools
1926.305	Jacks - Lever and Ratchet - Screw and Hydraulic
1926.401	Grounding and Bonding
1926.450	Ladders
1926.451	Scaffolding
1926.500	Guardrails, Handrails, and Covers
1926.501	Stairways
1926.550	Cranes and Derricks
1926.552	Material Hoists, Personnel Hoists and Elevators
1926.600	Equipment
1926.602	Material Handling Equipment
1926.604	Site Clearing
1926.650	General Protection Requirements (Excavations, Trenching, and Shoring)
1926.651	Specific Excavation Requirements
1926.652	Specific Trenching Requirements
1926.700	General Provisions (Concrete, Concrete Forms, and Shoring)
1926.701	Forms and Shoring
1926.750	Flooring Requirements (Steel Erection)
1926.751	Structural Steel Assembly
1926.803	Compressed Air
1926.850	Preparatory Operations (Demolition)
1926.851	Stairs, Passageways, and Ladders
1926.852	Chutes

1926.853	Removal of Materials Through Floor Openings
1926.857	Storage
1926.900	General Provisions (Blasting and Use of Explosives)
1926.951	Tools and Protective Equipment (Power Transmission and Distribution)
1926.952	Mechanical Equipment
1926.953	Material Handling
1926.957	Construction in Energized Substations

Commercial Art[1, 2]

1910.94	Ventilation
1910.101	Compressed Gases (General Requirements)
1910.106	Flammable and Combustible Liquids
1910.107	Spray Finishing Using Flammable and Combustible Materials
1910.133	Eye and Face Protection
1910.166	Inspection of Compressed Gas Cylinders
1910.167	Safety Relief Devices for Compressed Gas Cylinders
1910.168	Safety Relief Devices for Cargo and Portable Tanks Storing Compressed Gases
1910.176	Handling Materials - General
1910.212	General Requirements for All Machines
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.1000	Air Contaminants

Computer Programming[3, 4]

1910.176	Handling Materials - General
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.219	Mechanical Power-Transmission Apparatus
1910.242	Hand and Portable Powered Tools and Equipment, General

Cosmetology[5]

1910.94	Ventilation
1910.106	Flammable and Combustible Liquids
1910.107	Spray Finishing Using Flammable and Combustible Materials
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection

---

1. Nina Gilbert, Mary Cunningham, James Cramer, and Todd Moser.

2. Some commercial art operations include activities as offset printing. Therefore relevant standards may also be found in the treatment of Graphic Arts.

3. Bruce E. Victoriano.

4. Electronic Data Process operations contain a strong similarity to office operations; relevant standards may also be found under that category.

5. Patti Lewis.

1910.134	Respiratory Protection
1910.176	Handling Materials - General
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.264	Laundry Machinery and Operations
1910.1000	Air Contaminants

Construction

Treatment of the various building trades is accomplished according to individual category, for example carpentry, or plumbing, rather than grouping all together here. Please see individual classifications.

Drafting: Architectural, Engineering, Mechanical[1, 2]

1910.94	Ventilation
1910.106	Flammable and Combustible Liquids
1910.107	Spray Finishing Using Flammable and Combustible Materials
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.219	Mechanical Power-Transmission Apparatus
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.1000	Air Contaminants [particularly Ammonia]

Electricity; Electronics[3, 4]

1910.25	Portable Wood Ladders
1910.94	Ventilation
1910.95	Occupational Noise Exposure
1910.96	Ionizing Radiation
1910.97	Nonionizing Radiation
1910.106	Flammable and Combustible Liquids
1910.107	Spray Finishing Using Flammable and Combustible Materials
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.134	Respiratory Protection
1910.135	Occupational Head Protection
1910.136	Occupational Foot Protection

---

1. Hugh Dugan III, Donald C. Heffelfinger, Jr., and Edward L. Roadarmel.

2. Standards relevant to this classification may also be found in the treatment of Office Operations and Graphic Arts.

3. James D. Adams, Jr., Edmund Good, William Hastings, Robert A. Rioux, and Albert Yanushefsky.

4. Due to inherent similarities in many respects, *Electricity and Electronics* have been combined. There are further relationships to Appliance Repair, Plumbing (Heating, Air Conditioning) and the like.

1910.137	Electrical Protective Devices
1910.176	Handling Materials - General
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.213	Woodworking Machinery Requirements
1910.215	Abrasive Wheel Machinery
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.243	Guarding of Portable Powered Tools
1910.244	Other Portable Tools and Equipment
1910.1000	Air Contaminants
1926.20	General Safety and Health Provisions
1926.21	Safety Training and Education
1926.23	First Aid and Medical Attention
1926.24	Fire Protection and Prevention
1926.25	Housekeeping
1926.26	Illumination
1926.27	Sanitation
1926.28	Personal Protective Equipment
1926.50	Medical Services and First Aid
1926.51	Sanitation
1926.52	Occupational Noise Exposure
1926.53	Ionizing Radiation
1926.54	Nonionizing Radiation
1926.55	Gases, Vapors, Fumes, Dusts, and Mists
1926.56	Illumination
1926.57	Ventilation
1926.100	Head Protection
1926.101	Hearing Protection
1926.102	Eye and Face Protection
1926.103	Respiratory Protection
1926.150	Fire Protection
1926.151	Fire Prevention
1926.152	Flammable and Combustible Liquids
1926.154	Temporary Heating Devices
1926.200	Accident Prevention Signs and Tags
1926.202	Barricades
1926.250	General Requirements for Storage
1926.300	General Requirements (Tools - Hand and Power)
1926.301	Hand Tools
1926.302	Power Operated Hand Tools
1926.303	Abrasive Wheels and Tools
1926.400	General Requirements (Electrical)
1926.401	Grounding and Bonding
1926.402	Equipment Installation and Maintenance
1926.402	Battery Rooms and Battery Charging
1926.404	Hazardous Locations
1926.500	Guardrails, Handrails, and Covers
1926.501	Stairways
1926.950	General Requirements (Power Transmission and Distribution)
1926.951	Tools and Protective Equipment
1926.952	Mechanical Equipment
1926.953	Material Handling
1926.954	Grounding for Protection of Employees

1926.955	Overhead Lines
1926.956	Underground Lines
1926.957	Construction in Energized Substations
1926.958	External Load Helicopters
1926.959	Lineman's Body Belts, Safety Straps, and Lanyards

Foundry[1]

1910.25	Portable Wood Ladders
1910.26	Portable Metal Ladders
1910.28	Safety Requirements for Scaffolding
1910.94	Ventilation
1910.95	Occupational Noise Exposure
1910.96	Ionizing Radiation
1910.101	Compressed Gases (General Requirements)
1910.102	Acetylene
1910.103	Hydrogen
1910.104	Oxygen
1910.106	Flammable and Combustible Liquids
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.134	Respiratory Protection
1910.135	Occupational Head Protection
1910.136	Occupational Foot Protection
1910.166	Inspection of Compressed Gas Cylinders
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.178	Powered Industrial Trucks
1910.179	Overhead and Gantry Cranes
1910.180	Crawler, Locomotive, and Truck Cranes
1910.184	Slings
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.213	Woodworking Machinery Requirements
1910.215	Abrasive Wheel Machinery
1910.219	Mechanical Power-Transmission Apparatus
1910.242	Hand and Portable Powered Tools and Equipment
1910.243	Guarding of Portable Powered Tools
1910.244	Other Portable Tools and Equipment
1910.252	Welding, Cutting and Brazing
1910.1000	Air Contaminants

Graphic Arts[2]

1910.94	Ventilation
1910.95	Occupational Noise Exposure
1910.106	Flammable and Combustible Liquids
1910.132	General Requirements (Personal Protective Equipment)
1910.176	Handling Materials - General (Materials Handling and Storage)

---

1. R. Wahl.

2. *Ibid.*

1910.178	Powered Industrial Trucks
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.219	Mechanical Power-Transmission Apparatus
1910.242	Hand and Portable Powered Tools and Equipment
1910.1000	Air Contaminants

Dental Assistant[1]

1910.94	Ventilation
1910.95	Occupational Noise Exposure
1910.96	Ionizing Radiation
1910.101	Compressed Gases (General Requirements)
1910.106	Flammable and Combustible Liquids
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.242	Hand and Portable Powered Tools and Equipment
1910.1000	Air Contaminants

Health Assistant[2]

1910.94	Ventilation
1910.101	Compressed Gases (General Requirements)
1910.104	Oxygen
1910.106	Flammable and Combustible Liquids
1910.132	General Requirements (Personal Protective Equipment)
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.1000	Air Contaminants

Laboratory[3]

1910.94	Ventilation
1910.101	Compressed Gases (General Requirements)
1910.106	Flammable and Combustible Materials
1910.110	Storage and Handling of Liquified Petroleum Gases
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.134	Respiratory Protection

---

1. Marion S. Earhart.

2. Rose Ann Kublic.

3. Artie Kunselman and William A. Zehner.

1910.136	Occupational Foot Protection
1910.137	Electrical Protective Devices
1910.166	Inspection of Compressed Gas Cylinders
1910.167	Safety Relief Devices for Compressed Gas Cylinders
1910.169	Air Receivers
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.242	Hand and Portable Powered Tools and Equipment
1910.1000	Air Contaminants

Horticulture[1, 3]
(Greenhouse and Landscape Gardening)

1910.25	Portable Wood Ladders
1910.26	Portable Metal Ladders
1910.94	Ventilation
1910.95	Occupational Noise Exposure
1910.106	Flammable and Combustible Materials
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.134	Respiratory Protection
1910.135	Occupational Head Protection
1910.136	Occupational Foot Protection
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.243	Guarding of Portable Powered Tools
1910.266	Pulpwood Logging
1910.267	Agricultural Operations
1910.1000	Air Contaminants
1928.21	Applicable Standards in 29 CFR Part 1910 [1910 standards]
1928.51	Roll-over Protective Structures (ROPS) for Tractors Used in Agricultural Operations [if more than 20 horsepower]

Dairy Barn[2, 3]

1910.25	Portable Wood Ladders
1910.26	Portable Metal Ladders
1910.27	Fixed Ladders
1910.94	Ventilation
1910.106	Flammable and Combustible Materials

---

1. Paulette Onestak, R. Wahl.

2. R. Wahl.

3. For additional standards groupings applicable to vocational agriculture operations, see *Auto Repair, Carpentry, Diesel Repair, Electricity, Machine Shop, Plumbing, Welding*, etc.

1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.134	Respiratory Protection
1910.135	Occupational Head Protection
1910.136	Occupational Foot Protection
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.243	Guarding of Portable Powered Tools
1910.244	Other Portable Tools and Equipment
1910.1000	Air Contaminants
1928.21	Applicable Standards in 29 CFR 1910 [1910 Standards]
1928.51	Roll-over Protective Structures (ROPS) for Tractors Used in Agricultural Operations [if more than 20 horsepower]

Machine Shop[1]

1910.30	Other Working Surfaces
1910.94	Ventilation
1910.95	Occupational Noise Exposure
1910.101	Compressed Gases (General Requirements)
1910.106	Flammable and Combustible Liquids
1910.107	Spray Finishing Using Flammable and Combustible Materials
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.134	Respiratory Protection
1910.136	Occupational Foot Protection
1910.137	Electrical Protective Devices
1910.166	Inspection of Compressed Gas Cylinders
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.179	Overhead and Gantry Cranes
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.215	Abrasive Wheel Machinery
1910.217	Mechanical Power Presses
1910.218	Forging Machines
1910.219	Mechanical Power-Transmission Apparatus
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.252	Welding, Cutting and Brazing
1910.1000	Air Contaminants

Maintenance[2, 3]

1910.25	Portable Wood Ladders
1910.26	Portable Metal Ladders

---

1. Terry Houck, Fred E. Jenkins, Wayne Sweeney, and John Zavatsky.

2. John J. Bury, Wilson Hixon, and John Recklitis.

3. Additional standards pertinent to the maintenance function, depending upon program completeness and variations, may also be found under *Carpentry*, *Electrical*, *Machine Shop*, *Horticulture* (lawn care; outdoor), *Masonry*, etc.

1910.106	Flammable and Combustible Liquids
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.134	Respiratory Protection
1910.135	Occupational Head Protection
1910.136	Occupational Foot Protection
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.215	Abrasive Wheel Machinery
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.243	Guarding of Portable Powered Tools
1910.244	Other Portable - Tools and Equipment
1910.1000	Air Contaminants
1926.20	General Safety and Health Provisions
1926.21	Safety Training and Education
1926.23	First Aid and Medical Attention
1926.24	Fire Protection and Prevention
1926.25	Housekeeping
1926.26	Illumination
1926.27	Sanitation
1926.28	Personal Protective Equipment
1926.50	Medical Services and First Aid
1926.51	Sanitation
1926.52	Occupational Noise Exposure
1926.55	Gases, Vapors, Fumes, Dusts, and Mists
1926.56	Illumination
1926.57	Ventilation
1926.100	Head Protection
1926.101	Hearing Protection
1926.102	Eye and Face Protection
1926.103	Respiratory Protection
1926.104	Safety Belts, Lifelines, and Lanyards
1926.150	Fire Protection
1926.151	Fire Prevention
1926.152	Flammable and Combustible Liquids
1926.154	Temporary Heating Devices
1926.200	Accident Prevention Signs and Tags
1926.202	Barricades
1926.250	General Requirements for Storage
1926.251	Rigging Equipment for Material Handling
1926.300	General Requirements (Tools - Hand and Power)
1926.301	Hand Tools
1926.302	Power Operated Hand Tools
1926.303	Abrasive Wheels and Tools
1926.305	Jacks - Lever and Ratchet, Screw and Hydraulic
1926.400	General Requirements (Electrical)
1926.401	Grounding and Bonding
1926.450	Ladders
1926.451	Scaffolding
1926.500	Guardrails, Handrails, and Covers

1910.27	Fixed Ladders
1910.28	Safety Requirements for Scaffolding
1910.29	Manually Propelled Mobile Ladder Stands and Scaffolds (Towers)
1910.66	Power Platforms for Exterior Building Maintenance
1910.68	Manlifts
1910.94	Ventilation
1910.95	Occupational Noise Exposure
1910.97	Nonionizing Radiation
1910.101	Compressed Gases (General Requirements)
1910.102	Acetylene
1910.104	Oxygen
1910.106	Flammable and Combustible Liquids
1910.107	Spray Finishing Using Flammable and Combustible Materials
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.134	Respiratory Protection
1910.135	Occupational Head Protection
1910.136	Occupational Foot Protection
1910.137	Electrical Protective Devices
1910.166	Inspection of Compressed Gas Cylinders
1910.167	Safety Relief Devices for Compressed Gas Cylinders
1910.168	Air Receivers
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.178	Powered Industrial Trucks
1910.179	Overhead and Gantry Cranes
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.213	Woodworking Machinery Requirements
1910.215	Abrasive Wheel Machinery
1910.217	Mechanical Power Presses
1910.218	Forging Machines
1910.219	Mechanical Power-Transmission Apparatus
1910.242	Hand and Portable Powered Tools and Equipment
1910.243	Guarding of Portable Powered Tools
1910.244	Other Portable Tools and Equipment
1910.252	Welding, Cutting and Brazing
1910.262	Textiles
1910.263	Bakery Equipment
1910.264	Laundry Machinery and Operations
1910.265	Sawmills
1910.1000	Air Contaminants

Masonry[1]

1910.25	Portable Wood Ladders
1910.26	Portable Metal Ladders
1910.28	Safety Requirements for Scaffolding
1910.94	Ventilation
1910.95	Occupational Noise Exposure

1. Stacy Cartledge and R. Wahl.

1926.501	Stairways
1926.550	Cranes and Derricks
1926.552	Material Hoists, Personnel Hoists and Elevators
1926.650	General Protection Requirements (Excavations, Trenching, and Shoring)
1926.700	General Provisions (Concrete, Concrete Forms, and Shoring)
1926.701	Forms and Shoring

Needle Trades[1]

1910.94	Ventilation
1910.95	Occupational Noise Exposure
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.135	Occupational Head Protection
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.219	Mechanical Power-Transmission Apparatus
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.262	Textiles
1910.1000	Air Contaminants

Office and Classroom[2, 3]

1910.25	Portable Wood Ladders
1910.26	Portable Metal Ladders
1910.94	Ventilation
1910.95	Occupational Noise Exposure [dependent upon activity, function, or equipment in operation at a particular time]
1910.106	Flammable and Combustible Liquids
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.219	Mechanical Power-transmission Apparatus
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.1000	Air Contaminants

Plumbing[4]

1910.25	Portable Wood Ladders
1910.26	Portable Metal Ladders
1910.94	Ventilation

---

1. Nina Johnson and Edith R. Zeart.

2. R. Wahl.

3. With few exceptions, standards pertinent to office operations are virtually identical to those of classrooms.

4. R. E. Gibble, J. Hogarth, Charles Winther, and R. Wahl.

1910.101	Compressed Gases (General Requirements)
1910.102	Acetylene
1910.104	Oxygen
1910.106	Flammable and Combustible Liquids
1910.110	Storage and Handling of Liquified Petroleum Gases
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.134	Respiratory Protection
1910.135	Occupational Head Protection
1910.136	Occupational Foot Protection
1910.166	Inspection of Compressed Gas Cylinders
1910.167	Safety Relief Devices for Compressed Gas Cylinders
1910.168	Safety Relief Devices for Cargo and Portable Tanks Storing Compressed Gases.
1910.169	Air Receivers
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.252	Welding, Cutting and Brazing
1910.1000	Air Contaminants
1926.20	General Safety and Health Provisions
1926.21	Safety Training and Education
1926.22	Recording and Reporting of Injuries
1926.23	First Aid and Medical Attention
1926.24	Fire Protection and Prevention
1910.25	Housekeeping
1926.26	Illumination
1926.27	Sanitation
1926.28	Personal Protective Equipment
1926.50	Medical Services and First Aid
1926.51	Sanitation
1926.52	Occupational Noise Exposure
1926.55	Gases, Vapors, Fumes, Dusts, and Mists
1926.56	Illumination
1926.57	Ventilation
1926.100	Head Protection
1926.101	Hearing Protection
1926.102	Eye and Face Protection
1926.103	Respiratory Protection
1926.150	Fire Protection
1926.151	Fire Prevention
1926.152	Flammable and Combustible Liquids
1926.153	Liquified Petroleum Gas (LP-Gas)
1926.154	Temporary Heating Devices
1926.200	Accident Prevention Signs and Tags
1926.202	Barricades
1926.250	General Requirements for Storage
1926.251	Rigging Equipment for Material Handling
1926.300	General Requirements (Tools - Hand and Power)
1926.301	Hand Tools

1926.302	Power Operated Hand Tools
1926.303	Abrasive Wheels and Tools
1926.305	Jacks - Lever and Ratchet, Screw and Hydraulic
1926.350	Gas Welding and Cutting
1926.351	Arc Welding and Cutting
1926.352	Fire Prevention
1926.353	Ventilation and Protection in Welding, Cutting, and Heating
1926.354	Welding, Cutting, and Heating in Way of Preservative Coatings
1926.400	General Requirements (Electrical)
1926.401	Grounding and Bonding
1926.450	Ladders
1926.451	Scaffolding
1926.500	Guardrails, Handrails, and Covers
1926.501	Stairways
1926.550	Cranes and Derricks
1926.552	Material Hoists, Personnel Hoists and Elevators
1926.800	Tunnels and Shafts
1926.801	Caissons
1926.802	Cofferdams
1926.803	Compressed Air

Welding[1]

1910.25	Portable Wood Ladders
1910.26	Portable Metal Ladders
1910.27	Fixed Ladders
1910.28	Safety Requirements for Scaffolding
1910.30	Other Working Surfaces
1910.94	Ventilation
1910.95	Occupational Noise Exposure
1910.96	Ionizing Radiation
1910.97	Nonionizing Radiation
1910.101	Compressed Gases (General Requirements)
1910.102	Acetylene
1910.104	Oxygen
1910.106	Flammable and Combustible Liquids
1910.132	General Requirements (Personal Protective Equipment)
1910.133	Eye and Face Protection
1910.134	Respiratory Protection
1910.135	Occupational Head Protection
1910.136	Occupational Foot Protection
1910.137	Electrical Protective Devices
1910.166	Inspection of Compressed Gas Cylinders
1910.167	Safety Relief Devices for Compressed Gas Cylinders
1910.168	Safety Relief Devices for Cargo and Portable Tanks Storing Compressed Gases

---

1. John M. Ziegler and R. Wahl.

1910.169	Air Receivers
1910.176	Handling Materials - General (Materials Handling and Storage)
1910.179	Overhead and Gantry Cranes
1910.212	General Requirements for All Machines (Machinery and Machine Guarding)
1910.215	Abrasive Wheel Machinery
1910.219	Mechanical Power-Transmission Apparatus
1910.242	Hand and Portable Powered Tools and Equipment, General
1910.243	Guarding of Portable Powered Tools
1910.244	Other Portable Tools and Equipment
1910.252	Welding, Cutting and Brazing
1910.1000	Air Contaminants
1926.20	General Safety and Health Provisions
1926.21	Safety Training and Education
1926.22	Recording and Reporting of Injuries
1926.23	First Aid and Medical Attention
1926.24	Fire Protection and Prevention
1926.25	Housekeeping
1926.26	Illumination
1926.27	Sanitation
1926.28	Personal Protective Equipment
1926.50	Medical Services and First Aid
1926.51	Sanitation
1926.52	Occupational Noise Exposure
1926.53	Ionizing Radiation
1926.54	Nonionizing Radiation
1926.55	Gases, Vapors, Fumes, Dusts, and Mists
1926.56	Illumination
1926.57	Ventilation
1926.100	Head Protection
1926.101	Hearing Protection
1926.102	Eye and Face Protection
1926.103	Respiratory Protection
1926.150	Fire Protection
1926.151	Fire Prevention
1926.152	Flammable and Combustible Liquids
1926.154	Temporary Heating Devices
1926.200	Accident Prevention Signs and Tags
1926.202	Barricades
1926.250	General Requirements for Storage
1926.251	Rigging Equipment for Material Handling
1926.300	General Requirements (Tools - Hand and Power)
1926.301	Hand Tools
1926.302	Power Operated Hand Tools
1926.303	Abrasive Wheels and Tools
1926.305	Jacks - Lever and Ratchet, Screw and Hydraulic
1926.350	Gas Welding and Cutting
1926.351	Arc Welding and Cutting
1926.352	Fire Prevention
1926.353	Ventilation and Protection in Welding, Cutting, and Heating
1926.354	Welding, Cutting and Heating in Way of Preservative Coatings
1926.400	General Requirements (Electrical)
1926.401	Grounding and Bonding
1926.404	Hazardous Locations

1926.450	Ladders
1926.451	Scaffolding
1926.500	Guardrails, Handrails, and Covers
1926.501	Stairways
1926.550	Cranes and Derricks
1926.552	Material Hoists, Personnel Hoists and Elevators

It goes without saying that the foregoing lists address only a portion - and not a preponderant portion - of the occupational education offerings in vocational technical schools. However, sufficient have been presented to afford a varied cross-section as a guide to all educators, and to cooperative education instructors, coordinators, and others engaged in work study operations. Several relationships among the lists have been pointed out; there are others that educators will easily ascertain as applicable to fields not included in the listings.

Another factor of importance is that the previously referred to "general duty clause" - Section 5(a) of the *Act*,[1] must be considered as part of not only all the preceding listings, but as applicable to all occupations, whether taught or practiced. This clause covers all gaps and gray areas in the safety and health standards; therefore if there are no standards existing with respect to a given hazard, an employer may be cited on the strength of the clause itself:[2]

> Sec. 5.(a) Each employer -
>
> (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;
>
> (2) shall comply with occupational safety and health standards promulgated under this *Act* . . .

One more comment should be made in reference to the also previously treated standards of universal applicability. Not only must it be reiterated that these are a part of all occupational applicable standards, but also it may be seen that these address familiar items to educators, such as fire protection, electricity, sanitation, walking and working surfaces (floors, stairs, etc.) - and medical service. The standards addressing medical services are not precisely stated; however by interpretation, all employers must either have professional medical aid (physician; hospital) available within a matter of minutes, or have a qualified first aider as part of each work crew. A school safety and health plan must contain similar provisions for handling accidents, injuries, or other emergencies; similarly educators involved with cooperative education and other work study programs must look out for the existence of such arrangements at training stations. For all educators, familiarity with the

---

1. Congress of the United States, *Occupational Safety and Health Act of 1970.*

2. *Ibid.*, p. 4.

standards and the law will afford much greater insight to what has been presented here.

A word of caution in the implementation of the foregoing lists by educators is also necessary. Most of the lists have been prepared by the individuals referred to in the context of specific environmental situations. No two schools, shops, laboratories, or educational programs are precisely alike; therefore to adopt the listings verbatim would most certainly be a mistake. In some cases, they will prove inadequate; in others, redundant.

Their true utilization is what they are intended to be: a guide. As such, this publication is submitted.

VI. RESOURCES: MATERIALS AND INFORMATION

The basic document all educators will want and need, of course consists of the occupational safety and health standards for general industry. These are published by the U. S. Department of Labor under the designation: *General Industry: OSHA Safety and Health Standards (OSHA 2206)*. Single copies may be obtained by writing to the OSHA office covering the region in which one resides. In the case of Pennsylvanians, this address is: Assistant Regional Director for Occupational Safety and Health, 15220 Gateway Center, 3535 Market Street, Philadelphia, PA 19104.

Next in importance would be the safety and health standards for construction. These are published in Volume 39, Number 122 (Monday, June 24, 1974) *Federal Register*, Washington, D. C. Single copies may also be obtained at the OSHA Regional Office on written request. Additional copies may be purchased through the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Additional information, including publications lists and pamphlets, may be obtained by writing the Regional Office listed above, or the Office of Information, Occupational Safety and Health Administration, U. S. Department of Labor, Washington, D. C. 20210.

Publications lists, pamphlets, other materials, and information may similarly be obtained by writing: Division of Technical Services, Publications; National Institute for Occupational Safety and Health, Public Health Service, U. S. Department of Health, Education, and Welfare, 4676 Columbia Parkway, Cincinnati, Ohio 45226.

As has been inferred in preceding chapters, Commonwealth agencies where information and assistance may be obtained include:

Pennsylvania Department of Education
Bureau of Vocational Education
P. O. Box 911
Harrisburg, PA 17126

Pennsylvania Department of Environmental Resources
Bureau of Occupational Health
Fulton Building
Harrisburg, PA 17126

Pennsylvania Department of Labor and Industry
Bureau of Occupational and Industrial Safety
1700 Labor and Industry Building
Harrisburg, PA 17120

There are further a number of associations, organizations, and societies, most of them nationwide, but having state and/or local branches or chapters. Among these are the following:

AFL-CIO, 815 16th Street N.W., Washington, D. C. 20006

Air Moving and Conditioning Association, 80 West University Drive, Arlington Heights, Ill. 60004

American Academy of Occupational Medicine, 801 Old Lancaster Road, Bryn Mawr, PA 19010

American Association of Industrial Nurses, 79 Madison Avenue, New York, N.Y. 10016

American Chemical Society, 1155 16th Street, N.W., Washington, D. C. 20036

American Conference of Governmental Industrial Hygienists, P.O. Box 1937, Cincinnati, Ohio 45301

American Industrial Hygiene Association, 25711 Southfield Road, Southfield, Michigan 48075

American Institute of Industrial Engineers, Inc., 345 East 47th Street, New York, N.Y. 10017

American Insurance Association, 85 John Street, New York, N.Y. 10038

American Iron and Steel Institute, 150 East 42nd Street, New York, N.Y. 10017

American Medical Association -- Department of Environmental, Public, and Occupational Health, 535 North Dearborn Street, Chicago, Ill. 60610

American Mutual Insurance Alliance, 20 North Wacker Drive, Chicago, Ill. 60606

American National Red Cross, 17th and D Streets, N. W., Washington, D. C. 20006

American National Standards Institute, 1430 Broadway, New York, N.Y. 10018

American Optometric Association, Professional Development Division, 7000 Chippewa Street, St. Louis, MO 63119

American Petroleum Institute, 1801 K Street, N.W., Washington, D. C. 20006

American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, Michigan 49085

American Society of Heating, Refrigerating, and Air Conditioning Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017

American Society of Mechanical Engineers, 345 East 47th Street, New York, N.Y. 10017

American Society of Safety Engineers, 850 Busse Highway, Park Ridge, Ill. 60068

American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103

American Welding Society, 345 East 47th Street, New York City, New York 10017

Compressed Gas Association, 500 5th Avenue, New York, N.Y. 10036

Crane Manufacturers Association of America, 1326 Freeport Road, Pittsburgh, PA 15238

Health Physics Society, Executive Secretary Dr. Russell F. Cowing, P.O. Box 156, East Weymouth, Mass. 02189

Industrial Health Foundation, Inc., 5321 Centre Avenue, Pittsburgh, PA 15232

Industrial Medical Association, 150 North Wacker Drive, Chicago, Ill. 60606

Institute of Makers of Explosives, 420 Lexington Avenue, New York, N.Y. 10017

International Association of Government Labor Officials, 7310 Woodward Avenue, Detroit, Michigan 48202

International Association of Industrial Accident Boards and Commissions, 5600 Grand Avenue, Des Moines, Iowa 50312

International Association of Plumbing and Mechanical Officials, 5032 Alhambra Avenue, Los Angeles, Calif. 90032

International Labor Office, CH-1211, Geneva 22, Switzerland

Manufacturing Chemists' Association, 1825 Connecticut Avenue, N. W., Washington, D. C. 20009

Mount Sinai School of Medicine, University of New York, 100th Street and 5th Avenue, New York, N.Y. 10029

National Fire Protection Association, 470 Atlantic Avenue, Boston, Mass. 02110

National Safety Council, 425 North Michigan Avenue, Chicago, Ill. 60611

National Safety Management Society, P.O. Box 14092, Benjamin Franklin Station, Washington, D. C. 20044

Power Crane & Shovel Association, (Bureau of the Construction Industry Manufacturers Association), Marine Plaza #1700, 111 East Wisconsin Avenue, Milwaukee, Wisconsin 53202

Society of Automotive Engineers, Inc., 2 Pennsylvania Plaza, New York, New York 10001

Society of Fire Protection Engineers, 60 Batterymarch Street, Boston, Mass. 02110

The Society for Occupational and Environmental Health, Professor Harry Heimann, Mount Sinai School of Medicine, City University of New York, 100th Street and 5th Avenue, New York City, N.Y. 10029

Underwriters' Laboratories, Inc. 207 East Ohio Street, Chicago 60611

Unemployment Benefits Advisors, Inc., 720 Hotel Washington, Washington, D. C. 20004

References listed in the *Bibliography*, which concludes this publication, also constitute sources of information and assistance.

SELECTED BIBLIOGRAPHICAL REFERENCES

1. A. M. Best Company, *Best's Loss Control Engineering Manual.* Park Avenue, Morristown, New Jersey 07960: The Company, 1972. $70.00 (Annual Supplements, $20.00 yr.).

2. A. M. Best Company, *Best's Safety Directory.* Park Avenue, Morristown, New Jersey 07960: The Company. $20.00.

3. _____, *Best's Underwriting Guide.* Park Avenue, Morristown, New Jersey 07960: The Company.

4. Blake, Roland P., *Industrial Safety.* Englewood Cliffs, New Jersey: Prentice-Hall, Incorporated, 1953.

5. Bureau of National Affairs, Inc., *The International Environmental Guide.* 1231 25th Street, N.W., Washington, D. C. 20037: The Bureau, 1974/6. $95.00.

6. _____, *Noise Regulation Reporter.* 1231 25th Street, N.W., Washington, D. C. 20037: The Bureau, (Biweekly) $170.00.

7. _____, *Occupational Safety and Health Reporter.* 1231 25th Street, N.W., Washington, D. C. 20037: The Bureau, (Weekly) $222.00 yr.

8. _____, *The Toxic Substance: Control Act.* 1231 25th Street, N.W., Washington, D. C. 20037: The Bureau, 1977. $15.00.

9. Bureau of Occupational Safety and Health, Environmental Health Service, Public Health Service, U. S. Department of Health, Education, and Welfare (Powell, Charles H., and Hosey, Andrew D., Editors), *The Industrial Environment - Its Evaluation and Control: Syllabus.* Washington, D. C. 20402: Superintendent of Documents, U. S. Government Printing Office, 1970.

10. Congress of the United States, "Occupational Safety and Health Act of 1970," *Public Law 91-596.* (91st Congress) Washington, D. C. 20402: Superintendent of Documents, U. S. Government Printing Office, December 29, 1970.

11. Cox, Henry H., Managing Editor, *ASSE Journal: Official Publication of the American Society of Safety Engineers.* (Published Monthly) 850 Busse Highway, Park Ridge, Illinois 60068: American Society of Safety Engineers. Annual Subscription, $10.00.

12. Department of Labor (Occupational Safety and Health Administration), *Occupational Safety and Health: A Bibliography.* Springfield, Virginia 22151: National Technical Information Service, U. S. Department of Commerce, 1974. $8.00.

13. Eninger, Max U., "Operation Zero", *Accident Prevention Fundamentals.* (A Course) Box 11508, Pittsburgh, Pennsylvania 15238: Normax Publications, Incorporated. $50.00.

14. Francis, Samuel N., *Pennsylvania School Law.* (Three Volumes) Cleveland Ohio: Banks-Baldwin Company, 1970.

15. Gidel, Robert D., and Cestrone, Patrick F., *OSHA Compliance Guide: Vol. 3, Inspection Survey Guide for OSHA; A Self Inspection System.* Union National Bank Building, Wichita, Kansas 67202: Management Research and Development Institute, Incorporated, 1974. $5.95.

16. Gidel, Robert D., and Cestrone, Patrick F., *OSHA Inspection Survey Report.* (A Companion Report Form for use with Volume 3 - Inspection Survey Guide for OSHA - a self inspection system) Union National Bank Building, Wichita, Kansas 67202: Management Research and Development Institute, Incorporated, 1974.

17. International Labour Office (Geneva) *Encyclopedia of Occupational Health and Safety.* 330 West 42nd Street, New York 10036: McGraw-Hill Book Company (1974). $49.50 (two volumes).

18. Loss Prevention Department, Warner Insurance, *OSHA Check List: To help you comply with the requirements of the Occupational Safety and Health Act of 1970.* 4210 Peterson Avenue, Chicago, Illinois 60646: Warner Insurance, Lansing B. Warner, Incorporated.

19. Naidich, Arnold, *Do-It-Yourself Safety Inspection Manual.* 799 Broadway, New York, N.Y. 10003: Man & Manager, Inc., 1976. $35.00.

20. National Foremen's Institute, *Safety Management.* (Published Monthly) Waterford, Connecticut 06385: The Institute.

21. National Institute for Occupational Safety and Health, Center for Disease Control, Public Health Service, U. S. Department of Health, Education, and Welfare, *The Industrial Environment - Its Evaluation and Control.* (Third Edition) Washington, D. C. 20402: Superintendent of Documents, U. S. Government Printing Office, 1973.

22. National Institute for Occupational Safety and Health, Public Health Service, U. S. Department of Health, Education, and Welfare (Christensen, Herbert E., Editor), *The Toxic Substances List.* (Published Annually) Washington, D. C. 20402: Superintendent of Documents, U. S. Government Printing Office, 1973.

23. National Safety Council, *Accident Prevention Manual for Industrial Operations*. (Sixth Edition) 425 North Michigan Avenue, Chicago, Illinois 60611: The Council, 1972.

24. National Safety Council, *Fundamentals of Industrial Hygiene*. 425 North Michigan Avenue, Chicago, Illinois 60611: The Council (undated).

25. Occupational Safety and Health Administration, U. S. Department of Labor, *A Guide to Voluntary Compliance*. (A 40-hour course) Washington, D. C. 20409: National Audiovisual Center (GSA), 1974. Instructor Guide, Student Manual, and Slides: $55.00.

26. Occupational Safety and Health Administration, U. S. Department of Labor, *Construction Safety and Health*. (A 30-hour course) Washington, D. C. 20409: National Audiovisual Center (GSA), 1973 (Five Manuals; 466 Slides), or Washington, D. C. 20402: Superintendent of Documents, U. S. Government Printing Office (manuals only; 5 at $1.75 each), 1973.

27. Occupational Safety and Health Administration, U. S. Department of Labor, "Construction Safety and Health Regulations," *Federal Register*, Part II, Title 29 - Labor, Vol. 39, No. 122 (Monday, June 24, 1974). Washington, D. C. 20402: Superintendent of Documents, U. S. Government Printing Office.

28. Occupational Safety and Health Administration, U. S. Department of Labor, *Employer-Employee Rights and Responsibilities under the Williams-Steiger Occupational Safety and Health Act of 1970*. (A Seminar Course) Washington, D. C. 20409: National Audiovisual Center (GSA), 1974. Script and Slides: $30.00.

29. Occupational Safety and Health Administration, U. S. Department of Labor, *General Industry Guide for Applying Safety and Health Standards (29 CFR 1910)*. Washington, D. C. 20402: Superintendent of Documents, U. S. Government Printing Office, October 1972. $0.55.

30. Occupational Safety and Health Administration, U. S. Department of Labor, *Job Safety and Health*. (Published Monthly) Washington, D. C. 20402: Superintendent of Documents, U. S. Government Printing Office. Annual Subscription, $13.60.

31. Occupational Safety and Health Administration, U. S. Department of Labor, *General Industry Occupational Safety and Health Standards*. Washington, D. C. 20402: Superintendent of Documents, U. S. Government Printing Office, January 1976.

32. Occupational Safety and Health Administration, U. S. Department of Labor, "Occupational Safety and Health Standards for Maritime Employment," *Federal Register*, Part II, Title 29 - Labor, Vol. 39, No. 119 (Wednesday, June 19, 1974). Washington, D. C. 20402: Superintendent of Documents, U. S. Government Printing Office.

33. Occupational Safety and Health Administration, U. S. Department of Labor, *Occupational Safety and Health Subscription Service: Standards, Interpretations, Regulations, and Procedures.* (Five Volumes, indefinite update service) Washington, D. C. 20402: Superintendent of Documents, U. S. Government Printing Office, 1973. $48.50.

34. Occupational Safety and Health Administration, U. S. Department of Labor, *Safety and Health in Excavation and Trenching Operations.* (A Seminar Course) Washington, D. C. 20409: National Audio-visual Center (GSA), 1973. Script and Slides: $21.00.

35. Occupational Safety and Health Administration, U. S. Department of Labor, *Safety and Health Programming.* (A Seminar Course) Washington, D. C. 20210: The Administration (Office of Training and Education), 1974. Unpublished Manuscript; Instructor Guide and Student Manual.

36. Saretsky, Gary, "The Strangely Significant Case of Peter Doe," *Phi Delta Kappan.* Vol. LIV, No. 9 (May 1973), pp. 589-592. 8th and Union Streets, Bloomington, Indiana 47401: Phi Delta Kappa, Incorporated.

37. Shashack, Willard F., ed., *Occupational Safety and Health Act Handbook for Vocational and Technical Education Teachers.* (Directed by Dr. Jacob Stern) University of Illinois at Urbana 61801, 357 Education Building: Rurban Education Developmental Laboratory, Department of Vocational and Technical Education, The University, 1974. P.ii + 68 ($6.50).

38. Sheridan, Peter J., Editor, *Occupational Hazards.* (Published Monthly) P. O. Box 5746-U, Cleveland, Ohio 44115: Industrial Publishing Company, Division of Pittway Corporation. Annual Subscription, $18.00.

39. Strong, Merle E., ed., *Accident Prevention Manual for Training Programs.* Chicago, Illinois 60637: American Technical Society, 1975.

40. Sugarman, Stephen D., "Accountability Through the Courts," (The University of Chicago) *School Review.* Vol. 82, No. 2 (February 1974), pp. 233-259. 5835 Kimbark Avenue, Chicago, Illinois 60637: The University of Chicago Press.

41. Sugarman, Stephen D., "If Johnnie Can't Read - Get Yourself a Lawyer," *Learning: The Magazine for Creative Teaching.* Vol. 2, No. 8 (April 1974), pp. 26-31. 530 University Avenue, Palo Alto, California 94301: Education Today Company, Inc.

42. The General Assembly of Pennsylvania, *House Bill No. 770: An Act* (Amending Title 24 (Education) of the Pennsylvania Consolidated Statutes, adding provisions relating to education in public

and nonpublic schools and making repeals). Harrisburg, Pennsylvania: The Assembly, March 18, 1975. (Printer's No. 873) p. 445.

43. The General Assembly of Pennsylvania, *Senate Bill No. 480: An Act* (Amending Title 24 (Education) of the Pennsylvania Consolidated Statutes, adding provisions relating to education in public and nonpublic schools and making repeals). Harrisburg, Pennsylvania: The Assembly, April 7, 1975. (Printer's No. 494) p. 445.

44. United States Department of Labor, *Occupational Outlook Handbook 1976-77*. P. O. Box 13309, Philadelphia, Pennsylvania 19101: Bureau of Labor Statistics.

45. Utah State Board of Education, *Industrial Education: Safety Recommendations and UOSHA Standards* (Safety Guide). 1400 University Club Building, Salt Lake City, Utah 84111: The Board, 1974. Approximately $4.50 ea.

APPENDIX A

A Suggested Statement

of

Safety and Health Policy

APPENDIX A

A SUGGESTED STATEMENT OF SAFETY AND HEALTH POLICY

The employer should publish a policy statement of commitment. The following is an example:

"The personal safety and health of each employee of this company is of primary importance. The prevention of occupationally-induced injuries and illnesses is of such consequence that it will be given precedence over operating productivity whenever necessary. To the greatest degree possible, management will provide all mechanical and physical facilities required for personal safety and health in keeping with the highest standards.

"We will maintain a safety and health program conforming with the best practices of organizations of this type. To be successful, such a program must embody the proper attitudes toward injury and illness prevention on the part of both supervisors and employees. It also requires cooperation in all safety and health matters, not only between supervisor and employee, but also between each employee and his fellow workers. Only through such a cooperative effort can a safety record in the best interest of all be established and preserved.

"Our objective is a safety and health program that will reduce the number of disabling injuries and illnesses to a minimum, not merely in keeping with, but surpassing, the best experience of other operations similar to ours. Our goal is *zero* accidents and injuries.

"Our safety and health program will include:

- Providing mechanical and physical safeguards to the maximum extent that is possible;
- Conducting a program of safety and health inspections to find and get rid of unsafe working conditions or practices; to control health hazards; and to comply fully with the safety and health standards for every job;
- Training all employees in good safety and health practices;
- Providing necessary personal protective equipment and instructions for its use and care;

- Developing and enforcing safety and health rules; requiring that employees cooperate with these rules as a condition of employment;

- Investigating, promptly and thoroughly, every accident to find out what caused it and to correct the problem so that it won't happen again;

- Setting up a system of recognition and awards for outstanding safety service or performance.

"We recognize that the responsibilities for safety and health are shared:

- The employer is responsible, and accepts the responsibility, for leadership of the safety and health program, for its effectiveness and improvement, and for providing the safeguards required to ensure safe conditions;

- Supervisors are responsible for developing the proper attitudes toward safety and health in themselves and in those they supervise; and for ensuring that all operations are performed with the utmost regard for the safety and health of all personnel involved, including themselves;

- Employees are responsible for wholehearted, genuine cooperation with all aspects of the safety and health program-including compliance with all rules and regulations--and for continuously practicing safety while performing their duties."

APPENDIX B

Excerpts from

A GUIDE TO CHILD LABOR PROVISIONS

of the

Fair Labor Standards Act

Federal

APPENDIX B

EXCERPTS FROM A *GUIDE TO CHILD LABOR PROVISIONS*
OF
The Federal *Fair Labor Standards Act*

Those occupations declared to be particularly hazardous for minors between 16 and 18 years of age (also for minors 14 and 15) are included in the seventeen Hazardous Occupations Orders listed below:

(1) Occupations in or about plants or establishments manufacturing or storing explosives or articles containing explosive components.

(2) Occupations of motor-vehicle driver and helper.

(3) Coal-mine occupations.

(4) Logging occupations and occupations in the operation of any sawmill, lath mill, shingle mill, or cooperage-stock mill.

(5) Occupations involved in the operation of power-driven woodworking machines.*

(6) Occupations involving exposure to radioactive substances and to ionizing radiations.

(7) Occupations involved in the operation of elevators and other power-driven hoisting apparatus.

(8) Occupations involved in the operation of power-driven metal forming, punching, and shearing machines.*

(9) Occupations in connection with mining, other than coal.

(10) Occupations in or about slaughtering and meat-packing establishments and rendering plants.*

(11) Occupations involved in the operation of certain power-driven bakery machines.

(12) Occupations involved in the operation of certain power-driven paper-products machines.*

(13) Occupations involved in the manufacture of brick, tile, and kindred products.

---

* Exempt from Hazardous Area Classification for *bona fide* student-learners (see definition, p.151).

(14) Occupations involved in the operation of circular saws, band saws, and guillotine shears.*

(15) Occupations involved in wrecking, demolition, and ship-breaking operations.

(16) Occupations involved in roofing operations.*

(17) Occupations in excavation operations.*

Employment of 14- and 15-year-old minors is limited to certain occupations under conditions which do not interfere with their schooling, health, or well-being.

14-and 15-year-old minors may not be employed:

during school hours.

between 7 p.m. and 7 a.m. (time is measured according to local standards).

more than 3 hours a day - on school days.

more than 18 hours a week - in school weeks.

more than 8 hours a day - on nonschool days.

more than 40 hours a week - in nonschool weeks.

14- and 15-year-olds may be employed in:

(1) Office and clerical work (including operation of office machines).

(2) Cashiering, selling, modeling, art work, work in advertising departments, window trimming and comparative shopping.

(3) Price marking and tagging by hand or by machine. Assembling orders, packing and shelving.

(4) Bagging and carrying out customers' orders.

(5) Errand and delivery work by foot, bicycle, and public transportation.

(6) Clean up work, including the use of vacuum cleaners and floor waxers, and maintenance of grounds, but NOT including the use of power-driven mowers or cutters.

(7) Kitchen work and other work involved in preparing and serving food and beverages, including the operation of machines and devices used in the performance of such work, such as but not limited to, dish-washers, toasters, dumb-waiters, popcorn poppers, milk shake blenders, and coffee grinders.

---

*Ibid., p.147

(8) Work in connection with cars and trucks if confined to the following:

Dispensing gasoline and oil. Courtesy service. Car clearning, washing, and polishing. Other occupations permitted by this section.

But NOT including work:

Involving the use of pits, racks or lifting apparatus or involving the inflation of any tire mounted on a rim equipped with a removable retaining ring.

(9) Cleaning vegetables and fruits, and wrapping, sealing, labeling, weighing, pricing and stocking goods when performed in areas physically separate from areas where meat is prepared for sale and outside freezers or meat coolers.

14- and 15-year-old minors may be employed in any occupation except the excluded occupations listed below:

14- and 15-year-old minors may NOT be employed in -

(1) Any manufacturing occupation.

(2) Any mining occupation.

(3) Processing occupations (except in a retail, food service, or gasoline service establishment in those specific occupations expressly permitted there in accordance with the foregoing list).

(4) Occupations requiring the performance of any duties in workrooms or workplaces where goods are manufactured, mined, or otherwise processed (except to the extent expressly permitted in retail, food service, or gasoline service establishments in accordance with the foregoing list).

(5) Public messenger service.

(6) Operation or tending of hoisting apparatus or of any power-driven machinery (other than office machines and machines in retail, food service, and gasoline service establishments which are specified in the foregoing list as machines which such minors may operate in such establishments).

(7) Any occupations found and declared to be hazardous.

In September 1968 the regulation of 14 to 18 year-olds driving vehicles as part of their employment was amended as follows:

(a) Finding and declaration of fact: Except as provided in paragraph (b) thereof the occupations of motor-vehicle driver and outside helper on any public road, highway, in or about any mine (including open pit mine or quarry), place where logging or sawmill operations are in progress,

or in any excavation of the type identified in paragraph (a) 1500.68 (a) are particularly hazardous for the employment of minors between 16 and 18 years of age.

(b) Exemptions.

(1) Incidental and occasional driving. The finding and declaration in paragraph (a) shall not apply to the operation of automobiles or trucks not exceeding 6,000 pounds gross vehicle weight if such driving is restricted to daylight hours; provided, such operation is only occasional and incidental to the child's employment; that the child holds a State license valid for the type of driving involved in the job which he performs and has completed a State approved driver education course; and provided further, that the vehicle is equipped with a seat belt or similar device for the driver and for each helper, and the employer has instructed each child that such belts or other devices must be used. This subparagraph shall not be applicable to any occupation of motor-vehicle driver which involves the towing of vehicles.

(2) School bus driving. The finding and declaration in paragraph (a) shall not apply to driving a school bus during the period of any exemption which has been granted in the discretion of the Secretary of Labor on the basis of an application filed and approved by the Governor of the State in which the vehicle is registered. The Secretary will notify any State which inquires of the information to be furnished in the application. Neither shall the finding and declaration in paragraph (a) apply in a particular State during a period not to exceed the first 40 days after this amendment is effective while application for such exemption is being formulated by such State seeking merely to continue in effect unchanged its current program using such drivers, nor while such application is pending action by the Secretary.

(c) Definitions. For the purpose of this section:

(1) The term "motor vehicle" shall mean any automobile, truck, truck-tractor, trailer, semitrailer, motorcycle, or similar vehicle propelled or drawn by mechanical power and designed for use as a mean of transportation but shall not include any vehicle operated exclusively on rails.

(2) The term "driver" shall mean any individual who, in the course of his employment, drives a motor vehicle at any time.

(3) The term "outside helper" shall mean any individual, other than a driver, whose work includes riding on a motor vehicle outside the cab for the purpose of assisting in transporting or delivering goods.

(4) The term "gross vehicle weight" includes the truck chassis with lubricants, water and full tank or tanks of fuel, plus the weight of the cab or driver's compartment, body, and special chassis and body equipment, and payload.

Definition of Student-Learner

The law defines a *bona fide* student-learner as:[1]

a. The student-learner is enrolled in a course of study and training in a cooperative vocational training program under a recognized state or local educational authority or in a substantially similar program conducted by a private school; and

b. Such student-learner is employed under a written agreement which provides:

(1) That the work of the student-learner in the occupations declared particularly hazardous shall be incidental to his training;

(2) That such work shall be intermittent and for short periods of time, and under the direct and close supervision of a qualified and experienced person;

(3) That safety instructions shall be given by the school and correlated by the employer with on-the-job training;

(4) That a schedule of organized and progressive work processes to be performed on the job shall have been prepared. Each such written agreement shall contain the name of the student-learner, and shall be signed by the employer and the school coordinator or principal. Copies of each agreement shall be kept on file by both the school and the employer. This exemption for the employment of student-learners may be revoked in any individual situation where it is found that reasonable orecautions have not been observed for the safety of minors employed thereunder.

---

1. The Pennsylvania *Child Labor Law* contains similar definitions and treatment of hazardous occupations.

APPENDIX C

Excerpts from
Child Labor Regulations, Orders,
and Statements of Interpretation

Federal

Hazardous Occupations in Agriculture

APPENDIX C

EXCERPTS FROM CHILD LABOR REGULATIONS, ORDERS,
AND STATEMENTS OF INTERPRETATION

Federal *Hazardous Occupations in Agriculture*

On October 9, 1969, there was published in the *Federal Register* a proposal to revise Subpart E-1 of Part 1500 of Title 29 of the Code of Federal Regulations declaring certain occupations in agriculture to be particularly hazardous for the employment of children below the age of 16. After consideration of all oral and written matter presented in response to the proposal, Subpart E-1 of Part 1500 of Title 29 of the Code of Federal Regulations is revised in the manner set out below.

This revision will be effective January 1, 1970, or 30 days after publication in the *Federal Register*, whichever is later. In the event the effective date is subsequent to January 1, 1970, the present rules in Subpart E-1 shall be effective between January 1, 1970, and the effective date of this document.

Subpart E-1 is revised to read as follows:

Subpart E-1 --- Occupations in Agriculture Particularly Hazardous for the Employment of Children Below the Age of 16

Sec.
1500.70 Purpose and scope.
1500.71 Occupations involved in agriculture.
1500.72 Exemptions.

AUTHORITY: The provisions of this Subpart E-1 issued under secs. 12, 12, 18, 52 Stat. 1067, 1069, as amended; 29 U.S.C. 212, 213, 218.

§§ 1500.70 Purpose and scope.

(a) *Purpose.* Section 13(c) (2) of the Fair Labor Standards Act of 1938, as amended (29 U.S.C. 213(c) (2)) states that the "provisions of section 12 [of the Act] relating to child labor shall apply to an employee below the age of 16 employed in agriculture in an occupation that the Secretary of Labor finds and declares to be particularly hazardous for the employment of children below the age of 16, except where such employee is employed by his parent on a farm owned or operated by such parent or person." The purpose of this subpart is to apply this statutory provision.

(b) *Exception.* This subpart shall not apply to the employment of a child below the age of 16 by his parent or by a person standing in the place of his parent on a farm owned or operated by such parent or person.

(c) *Statutory Definitions.* As used in this subpart, the terms "agriculture," "employer," and "employ" have the same meanings as the identical terms contained in section 3 of the Fair Labor Standards Act of 1938, as amended (29 U.S.C. 203) which are as follows:

(1) "Agriculture" includes farming in all its branches and among other things includes the cultivation and tilage of soil, dairying, the production, cultivation, growing, and harvesting of any agricultural or horticultural commodities (including commodities defined as agricultural commodities in section 15 (g) of the Agricultural Marketing Act, as amended), the raising of livestock, bees, fur-bearing animals, or poultry, and any practices (including any forestry or lumbering operations) performed by a farmer or on a farm as an incident to or in conjunction with such farming operations, including preparation for market, delivery to storage or to market or to carriers for transportation to market.

(2) "Employer" includes any person acting directly or indirectly in the interest of an employer in relation to an employee but shall not include the United States or any State or political subdivision of a State (except with respect to employees of a State or a political subdivision thereof, employed (i) in a hospital, institution, or school referred to in the last sentence of section (r) of the Act, or (ii) in the operation of a railway or carrier referred to in such sentence), or any labor organization (other than when acting as an employer), or anyone acting in the capacity of officer or agent of such labor organization. (iii) "Employ" includes to suffer or permit to work.

§ 1500.71 Occupations involved in Agriculture.

(a) *Findings and declarations of fact as to specific occupations.* The following occupations in agriculture are particularly hazardous for the employment of children below the age of 16:

(1) Operating a tractor of over 20 PTO horsepower, or connecting or disconnecting an implement or any of its parts to or from such a tractor.

(2) Operating or assisting to operate (including starting, stopping, adjusting, feeding, or any other activity involving physical contact associated with the operation) any of the following machines:

(i) Corn picker, cotton picker, grain combine, hay mower, forage harvester hay baler, potato digger, or mobile pea viner;

(ii) Feed grinder, crop dryer, forage blower, auger conveyor, or the unloading mechanism of a nongravity-

type self-unloading wagon or trailer; or

(iii) Power post-hole digger, power post driver, or nonwalking type rotary tiller.

(3) Operating or assisting to operate (including starting, stopping, adjusting, feeding, or any other activity involving physical contact associated with the operation) any of the following machines:

(i) Trencher or earthmoving equipment;

(ii) Fork lift;

(iii) Potato combine; or

(iv) Power-driven circular, band, or chain saw.

(4) Working on a farm in a yard, pen, or stall occupied by a:

(i) Bull, boar, or stud horse maintained for breeding purposes; or

(ii) Sow with suckling pigs, or cow with newborn calf (with umbilical cord present).

(5) Felling, bucking, skidding, loading, or unloading timber with butt diameter of more than 6 inches.

(6) Working from a ladder or scaffold (painting, repairing, or building structures, pruning trees, picking fruit, etc.) at a height of over 20 feet.

(7) Driving a bus, truck, or automobile when transporting passengers, or riding on a tractor as a passenger or helper.

(8) Working inside:

(i) A fruit, forage, or grain storage designed to retain an oxygen deficient or toxic atmosphere;

(ii) An upright silo within 2 weeks after silage has been added or when a top unloading device is in operating position;

(iii) A manure pit; or

(iv) A horizontal silo while operating a tractor for packing purposes.

(9) Handling or applying (including cleaning or decontaminating equipment, disposal or return of empty containers, or serving as a flagman for aircraft applying) agricultural chemicals classified under the Federal Insecticide, Fungicide Rodenticide Act (7 U.S.C. 135 et seq.) as Category I of toxicity, identified by the word "poison" and the "skull and crossbones" on the label; or Category II of toxicity, identified by the word "warning" on the label;

(10) Handling or using a blasting agent, including but not limited to, dynamite, black powder, sensitized ammonium nitrate, blasting caps, and primer cord; or

(11) Transporting, transferring, or applying anhydrous ammonia.

(b) *Occupational definitions.* In applying machinery, equipment, or facility terms used in paragraph (a) of this section, the Bureau of Labor Standards will be guided by the definitions contained in the current edition of "Agricultural Engineering", a dictionary and handbook, Interstate Printers and Publishers, Danville, Ill. Copies of this dictionary and handbook are available for examination in Regional Offices of the Bureau of Labor Standards, U. S. Department of Labor.

§ 1500.72 Exemptions.

(a) *Student-learners.* The findings and declarations of fact in § 1500.71 (a) shall not apply to the employment of any child as vocational agriculture student-learner in any of the occupations described in subparagraph (1), (2), (3), (4), (5), or (6) of § 1500.71(a) when each of the following requirements are met: (1) The student-learner is enrolled in a vocational education training program in agriculture under a recognized State or local educational authority, or in a substantially similar program conducted by a private school; (2) such student-learner is employed under a written agreement which provides; (i) that the work of the student-learner is incidental to his training; (ii) that such work shall be intermittent, for short periods of time, and under the direct and close supervision of a qualified and experienced person; (iii) that safety instruction shall be given by the school and correlated by the employer with on-the-job training; and (iv) that a schedule of organized and progressive work processes to be performed on the job have been prepared; (3) such written agreement contains the name of the student-learner, and is signed by the employer and by a person authorized to represent the educational authority or school; and (4) copies of each such agreement are kept on file by both the educational authority or school and by the employer.

(b) *Federal Extension Service.* The findings and declarations of fact in § 1500.71 (a) shall not apply to the employment of a child under 16 years of age in those occupations in which he has successfully completed one or more training programs described in subparagraph (1), (2), or (3) of this paragraph provided he has been instructed by his employer on safe and proper operation of the specific equipment he is to use; is continuously and closely supervised by the employer where feasible; or, where not feasible, in work such as cultivating, his safety is checked by the employer at least at midmorning, noon, and midafternoon.

(1) *4-H Tractor operation program.* The child is qualified to be employed in an occupation described in subparagraph (1) of § 1500.71 (a) provided:

(i) He is a 4-H member;

(ii) He is 14 years of age, or older;

(iii) He is familiar with the normal working hazards in agriculture;

(iv) He has completed a 10-hour training program which includes the following units from the manuals of the 4-H tractor program conducted by, or in accordance with the requirements of, the Cooperative Extension Service of a land grant university:

(a) First-Year Manual:

Unit 1 - Learning How to Be Safe;
Unit 4 - The instrument Panel;
Unit 5 - Controls for Your Tractor;
Unit 6 - Daily Maintenance and Safety Check; and
Unit 7 - Starting and Stopping Your Tractor.

(b) Second-Year Manual:

Unit 1 - Tractor Safety on the Farm;

(c) Third-Year Manual:

Unit 1 - Tractor Safety on the Highway;
Unit 3 - Hitches, Power-take-off, and Hydraulic Controls;

(v) He has passed a written examination on tractor safety and has demonstrated his ability to operate a tractor safely with a two-wheeled trailed implement on a course similar to one of the 4-H Tractor Operator's Contest Courses; and

(vi) His employer has on file with the child's records kept pursuant to Part 516 of this title (basically, name, address, and date of birth) a copy of a certificate acceptable by the Bureau of Labor Standards, signed by the leader who conducted the training program and by an Extension Agent of the Cooperative Extension Service of a land grant university to the effect that the child has completed all the requirements specified in subdivisions (i) through (v) of this subparagraph.

(2) *4-H Machine operation program.* The child is qualified to be employed in an occupation described in subparagraph (2) of § 1500.71(a) providing:

(i) He satisfies all the requirements specified in subdivisions (i) through (v), of subparagraph (1) of this paragraph;

(ii) He has completed an additional 10-hour training program on farm machinery safety, including 4-H Fourth-Year Manual, Unit 1, Safe Use of Farm Machinery;

(iii) He has passed a written and practical examination on safe machinery operation; and

(iv) His employer has on file with the child's records kept pursuant to Part 516 of this title (basically name, address, and date of birth) a copy of a certificate acceptable by the Bureau of Labor Standards, signed by the leader who conducted the training program and by an Extension Agent of the Cooperative Extension Service of a land grant university, to the effect that the child has completed all of the requirements specified in subdivisions (i) through (iii) of this subparagraph.

(3) *Tractor and machine operation program.* The child is qualified to be employed in an occupation described in subparagraphs (1) and (2) of § 1500.71(a) providing:

(i) He is 14 years of age, or older;

(ii) He has completed a 4-hour orientation course familiarizing him with the normal working hazards in agriculture;

(iii) He has completed a 20-hour training program on safe operation of tractors and farm machinery, which covers all material specified in subparagraphs (1) (iv) and (2) (ii) of this paragraph.

(iv) He has passed a written examination on tractor and farm machinery safety, and has demonstrated his ability to operate a tractor with a two-wheeled trailed implement on a course similar to a 4-H Tractor Operator's Contest Course, and to operate farm machinery safely.

(v) His employer has on file with the child's records kept pursuant to Part 516 of this title (basically, name, address and date of birth) a copy of a certificate acceptable by the Bureau of Labor Standards, signed by the volunteer leader who conducted the training program and by an Extension Agent of the Cooperative Extension Service of a land grant university, to the effect that all of the requirements of subdivisions (i) through (iv) of this subparagraph have been met.

(c) *Vocational agriculture training.* The findings and declarations of fact in § 1500.71(a) shall not apply to the employment of a vocational agriculture student under 16 years of age in those occupations in which he has successfully completed one or more training programs described in subparagraph (1) or (2) of this paragraph and who has been instructed by his employer in the safe and proper operation of the specific equipment he is to use, who is continuously and closely supervised

by his employer where feasible or, where not feasible, in work such as cultivating, whose safety is checked by the employer at least at midmorning, noon, and midafternoon, and who also satisfies whichever of the following program requirements are pertinent:

(1) *Tractor operation program.* The student is qualified to be employed in an occupation described in subparagraph (1) of § 1500.71(a) provided:

(i) He is 14 years of age, or older;

(ii) He is familiar with the normal working hazards in agriculture;

(iii) He has completed a 15-hour training program which includes the required units specified in the Vocational Agriculture Training Program in Safe Tractor Operation, outlined by the Office of Education, U. S. Department of Health, Education, and Welfare and acceptable by the U. S. Department of Labor. The training program is outlined in Special Paper No. 8, April 1969, prepared at Michigan State University, East Lansing, Mich., for the Office of Education. Copies of this training program outline are available for examination in the Regional Offices of the Bureau of Labor Standards, U. S. Department of Labor, and a copy may be obtained from the Office of Education, U. S. Department of Health, Education, and Welfare, Washington, D. C. 20202.

(iv) He has passed both a written test and a practical test on tractor safety including a demonstration of his ability to operate safety a tractor with a two-wheeled trailed implement on a test course similar to that described in the Vocational Agriculture Training Program in Safe Tractor Operation, outlined by the Office of Education, U. S. Department of Health, Education, and Welfare; and

(v) His employer has on file with the child's records kept pursuant to Part 516 of this title (basically name, address, and date of birth) a copy of a certificate acceptable by the Bureau of Labor Standards, signed by the Vocational Agriculture teacher who conducted the program to the effect that the student has completed all the requirements specified in subdivisions (i) through (iv) of this subparagraph.

(2) *Machinery operation program.* The student is qualified to be employed in an occupation described in subparagraph (2) of § 1500.71(a) provided he has completed the Tractor Operation Program described in subparagraph (1) of this paragraph and:

(i) He has completed an additional 10-hour training program which includes the required units specified in the Vocational Agriculture Training Program in Safe Farm Machinery Operation, outlined by the Office of Education, U. S. Department of Health, Education, and Welfare and approved by the U. S. Department of Labor;

(ii) He has passed both a written test and a practical test on safe machinery operation similar to that described in the Vocational Agriculture Training Program in Safe Farm Machinery Operation, outlined by the Office of Education, U. S. Department of Health, Education, and Welfare; and

(iii) His employer has on file with the child's records kept pursurant to Part 516 of this title (basically name, address and date of birth) a copy of a certificate acceptable by the Bureau of Labor Standards signed by the Vocational Agriculture teacher who conducted the program to the effect that student has completed all the requirements specified in subdivisions (i) and (ii) of this subparagraph.

(d) *Agency review.* The provisions of paragraphs (a), (b), and (c) of this section will be reviewed and reevaluated before January 1, 1972. In addition, determinations will be made as to whether the use of protective frames, crush resistant cabs, and other personal protective devices should be made a condition of these exemptions.

Signed at Washington, D. C., this 31st day of December 1969.